

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

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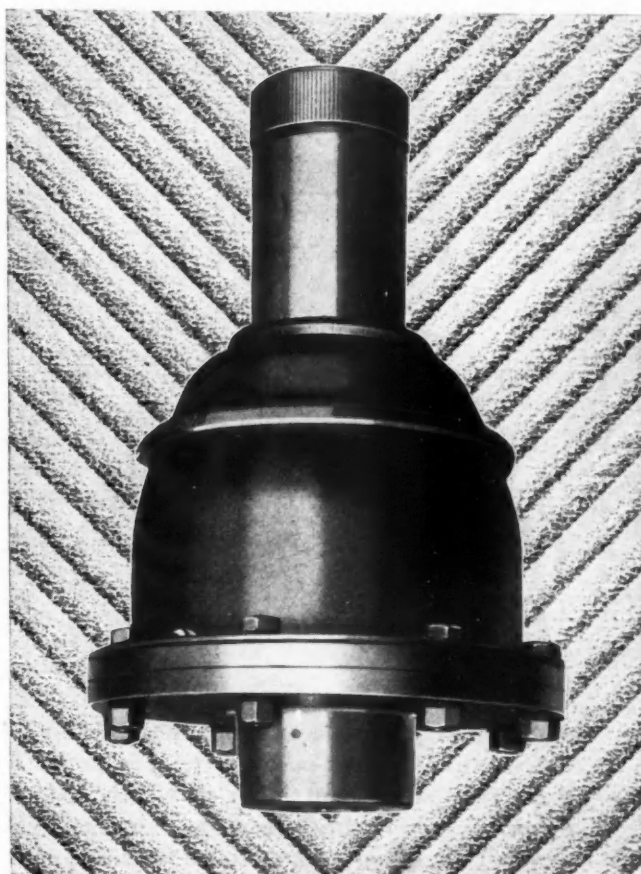
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Automotive Industries

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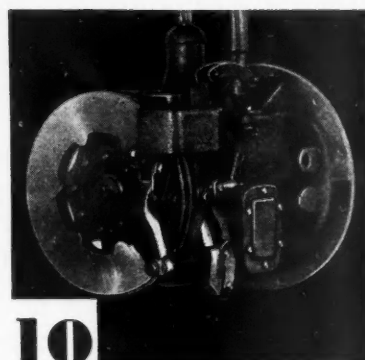
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A REAL EMERGENCY BRAKE

Topsy-Turvy Tax Legislation Hits Industry With 4-3-2-Levy

SHABBIER treatment than that given the automotive industry by the majority of the Senate Committee on Finance is difficult to conceive.

Refusing flatly to heed the plea of manufacturers to eliminate the House tax levies of 3, 2 and 1 per cent, respectively, on passenger cars, trucks and accessories, the committee stretched injustice even further and actually raised the taxes!

Automotive levies were boosted to reach 4 per cent on passenger cars, 3 per cent on trucks and 2 per cent on accessories.

The original Treasury recommendation for restoration of the 1924 motor excise taxes was finally adopted on trucks, while the tax is but 1 per cent below the old 5 per cent rate on passenger cars and only $\frac{1}{2}$ per cent below the old rate of 2.5 per cent on accessories.

Previously the vacillating committee had voted to retain the House taxes. But its constantly-changing position on this and other sections of the bill had become so commonplace that the committee became the butt of a joke even among its own members. It shifted so frequently that it apparently did not know whether it was in a forward or reverse gear, perhaps due to its many fumbling attempts to go into a political neutral that would cost neither condemnation nor votes.

This does not reflect fully the grotesque and unfair performance of the committee. The spectacle is made more ludicrous when attention is drawn to the committee's ultimate action on other excise taxes on which it has wobbled back and forth several times. From the outset it showed a tender solicitude for the candy industry by striking out the House tax on this delicacy. And in the end it eliminated excise taxes on furs, jewelry, mechanical refrigerators, sporting goods, firearms, cameras, toilet articles, boats, matches, soft drinks, produce exchange and safe deposit boxes.



by
L. W.
Moffett

Without reflecting in the least on the importance of these items and with full approval of protests made against these or any other discriminatory taxes, it clearly is a fact that as an economic factor by way of stimulating employment and business, they do not rank with the automotive industry.

Yet the automotive industry, which has instituted a tremendous move at a high cost almost on the basis of a gamble to start the country toward prosperity, is made the victim of a capricious Senate committee. Even President Hoover recently backed the automotive industry's move with a "sales" letter encouraging early buying of cars.

In this the President certainly did not appear to have the support of Secretary of the Treasury Mills. For it was the Secretary who from the outset has urged the automotive taxes. It was the Secretary who appeared before the Senate Committee on the day of its final action and almost peremptorily commanded it to act and act quickly so that the budget would be

balanced. As an alternative to increased taxes on tobacco the Secretary again insisted on the Treasury's 1924 excise taxes on the automotive industry as he had done before. He came near getting them, as indicated. So it is with Mr. Mills lies partial responsibility for the proposed motor excise taxes as reported in the Senate bill. Nevertheless, the committee is supposed to be made up of Senators perfectly capable of voting their own minds, regardless of the wishes of the Secretary of the Treasury. It may be that the Senators did so vote, though it is difficult to believe they would have actually increased the rates had it not been for the stout representations made by Secretary Mills. It is reported, however, that the verbal lashing given the committee became so vigorous that the committee was almost frightened out of its wits, and hardly knew what it was doing.

Automotive Industry "Sacrificed"

The Secretary's demonstration before the committee is said to have been one rarely dared by anyone, cabinet officer or anyone else, before a committee of Congress. It is perhaps true he felt that he was buttressed in his position by bristling statements from President Hoover taking Congress to task for failure to grasp the emergency conditions facing the country and to produce quick and constructive performance. The wildcat legislation of the House had been particularly assailed by the President who manifestly has the support of the country back of him.

In any case, when other excise taxes were removed, the loss of revenue had to be made up. So the automotive industry was again placed on the altar of sacrifice. Which explains the increase over the House levies. In its own assured way, the Senate Committee assumes greater revenue will come from the higher taxes than would come from the lower taxes. This remains to be seen if the higher levies are finally enacted into law. It is the thought of many that an opposite effect will result. This is based on the belief that the higher levies will dam further potential buying of passenger cars and trucks and therefore will not net the return estimated. The House estimated its levies would raise \$56,000,000 revenue in the fiscal year 1933.

The Senate Committee estimates a return of \$81,000,000, divided as follows: Passenger cars, \$59,000,000; trucks, \$6,000,000; accessories, \$16,000,000. Secretary Mills had estimated the Treasury recommendations if adopted would bring in \$100,000,000 revenue.

The accessories provision was altered by the removal of tires. Therefore, they will not be subject to an excise tax.

Tires Taxed

But the committee first removed tires from the taxable list and substituted a tax—really a tariff—of 5 cents per pound on crude rubber, estimated to raise \$53,000,000, then, two days later, voted a manufacturer's sales tax of three cents a pound on casings and five cents a pound on inner tubes.

After several of its back-and-forth movements, the committee adopted the House rate of four cents per gallon on domestic lubricating oil, estimated to raise \$35,000,000; one-half cent per gallon on imported crude oil, estimate not given; and two and a half cents per gallon on imported gasoline.

While the Senate committee, again after reversing itself, adopted the House limitation of two years on the emergency revenue measure, to expire July 1, 1934,

the taxes on passenger cars, motor trucks and accessories are proposed for expiration Aug. 1, 1934. This was done in order to provide for refunds by manufacturers on cars in the hands of dealers.

The motion to increase motor taxes was carried by a vote of 11 to 7. Senators voting affirmatively were: Watson, Indiana; Reed, Pennsylvania; Shortridge, California; Metcalf, Rhode Island, and Smoot, Utah, Republicans; Harrison, Mississippi; King, Utah; George, Georgia; Walsh, Massachusetts; Barkley, Kentucky, and Hull, Tennessee, Democrats. Those voting against the motion were: Couzens, Michigan; Keyes, New Hampshire; Bingham, Connecticut; Thomas, Idaho; Jones, Washington, and La Follette, Wisconsin, Republicans, and Connally, Texas, Democrat.

Previously, Senator Couzens led a futile fight to strike out the taxes entirely. His motion was lost by a vote of 6 to 12. On that occasion Senators Watson and Reed supported the motion, while Senator La Follette voted against it.

The motor industry is preparing to make its last ditch stand against the taxes. It will carry the fight to the Senate floor where the next action on the taxes will take place. If the Senate accepts the Finance Committee levies, those of the House or compromise taxes, however, it is altogether likely the heroic efforts of the industry will have been in vain. For the next and final step before enactment of the law will be to send the bill to conference. Here selected members of the House Ways and Means Committee and the Senate Committee on Finance will thrash out differences prior to making recommendations to their respective branches of Congress before the bill is finally approved. The conference could recommend taxes adopted by either branch or it could recommend their entire elimination, subject to approval by Congress. It is seriously doubted that the conference would recommend elimination of the taxes if both branches had voted for them.

Senate Battle is Next

The final contest then may really be considered to be on the Senate floor. What the industry may be able to do is difficult to predict. It will have considerable support, including that of powerful farm organizations, such as the National Grange, the American Farm Bureau Federation and the National Farmers Union. Yet these organizations have fought before committees on behalf of the industry, as represented by the National Automobile Chamber of Commerce, but did not accomplish their purpose.

Politically, it is said the Democrats who in the past have come to the support of the automotive in its fight against excise taxes may give a strong Senate vote for the taxes. This is based on the theory that the taxes largely represent a Treasury plan and that reaction against the taxes will be unfavorable and rest on the administration in power. The Democrats also are said to be altogether willing to see the Committee on Finance put in a bad light. For the antics of the committee and the scolding it received from the administration have proved a choice morsel for the Democrats.

This was reflected by Senator Connally of Texas. Asked what the Finance Committee had finally done with the revenue bill, the Texas Senator forgot for the moment his widely recognized scholarly attainments and replied:

"Aw, they tore it to hell!"

JUST AMONG OURSELVES

When Help Becomes a Nuisance

WHEN does manufacturers' aid to dealers become paternalism? Where is that hazy line between "help" and "nuisance"?

Nobody knows exactly, because what one dealer considers to be useful assistance from the factory may be just a pain in the neck to his retailing neighbor.

Excessive competition for the attention and efforts of retailers has undoubtedly brought to the desk of the average dealer more "helps," factory men and systems than he can reasonably absorb and put into practice.

Capitalizing on these excesses some factories right now are using as a selling point in their dealer campaigns the fact that they won't deluge the retailer with men, methods or literature. One recent campaign from a car manufacturer, for example, emphasizes the "it's-here-if-you-want-it" attitude as regards all factory helps to dealers.

Chief sales executive of another car factory which has provided its dealers with a very large amount of potentially useful and sound operating data and helps has finally come to the conclusion that one good merchandising idea at a time, followed through and put into practice widely by dealers, will benefit the factory more than the more superficial attention which the greater mass of information necessarily gets at present.

Some factories are moving toward greater paternalism on fewer items; others to less paternalism in all relationships; and still others to maximum of paternalism and increased contacts as well.

So the different methods battle merrily on!

Verily—Verily—

THE success or failure of a man entering into manufacture, transportation or into agriculture depends more upon his skill as a prophet than upon his industry as a producer," says Dr. Arthur T. Hadley, president of Yale.

Joblessness Brings New Economic Ideas

WHEN a fellow is out of a job thoughts crowd to the foreground of his mind which previously slithered silently about the limbo of his subconsciousness. A lot of fellows are out of a job today; one out of every six potential working Americans, some authorities tell us. What those men are thinking is of importance to the executives of American industry.

We've had a number of very interesting letters from men who, until recently, have been holding positions in the automotive industry, some of considerable responsibility. Some are bitter, some full of hopelessness and some still optimistic. But all contain unusually frank statements of opinion. What the intelligent unemployed man thinks

is not only interesting but important to executives, whether they agree with them or not; they are of importance, in fact, to all of us who still hold jobs.

Promotes Golden Rule as Profit Maker

WE are all agreed that the depression is at least 75 per cent psychological," writes one newly recruited member of the unemployed, for example. "But the psychopathology of the depression goes a little deeper than most people suspect. In a subconscious way we feel that the past decade of ruthless individual competition was running counter to the very backbone of industrialism, which is cooperation.

"But man has been a selfish brute for so many million years that it is perhaps too much to expect him to change overnight. Still if it can be shown to the average American that it is good business to look out for the well-being of his neighbor, he may not be so reluctant to accept the new doctrine.

"You know better than I do how profits in the past have been shunted into overcapitalization and overexpansion, instead of being plowed back into the consumer in the form of higher wages. According to Stuart Chase, the living standard of the American workman has never been any too high after all.

"This is why I am hoping for the depression to last another five years; by that time suffering will have forced us out of the old rut and into new ways of doing things. But would it not be so much more splendid if our industry could lead us out of the wilderness once more by way of better engineering of human affairs?

"Yours for less ballyhoo and more action. . . ."—N.G.S.

Strength Increased When Gears Are Designed

IN a paper entitled "New Light on the Strength of Gear Teeth," by A. B. Cox, he developed a new method of calculating the strength of gear teeth intended to conform better to the present highly refined methods of cutting teeth, and incidentally showed that from the standpoint of maximum strength it is highly advantageous to so design gears that two pairs of teeth and no more are in contact at all times.

He was one of the principal speakers at the annual meeting of the American Gear Manufacturers Association, May 12 and 13, in Cleveland.

The Lewis formula, for the strength of gear teeth, which has been widely used in the past, dates back to 1893. Owing to the crudeness of production methods then in use, Lewis assumed that the entire tooth load was taken by a single pair of teeth, and the safe strength of the gears naturally is determined by the stresses set up when the load is supported by the tooth under the condition most unfavorable to strength, viz., at its very end. In practice, when a gear tooth contacts with a tooth of a mating gear at its extreme end, there is always at least a second pair of teeth in contact and takes part of the load. Mr. Cox admitted that the division of the load between the two pairs of teeth is a very complex problem, involving nine variables. However, when two pairs of teeth are in contact in a gearset under static load, no tooth of either contacting pair can break without first taking a "permanent set" sufficient to load the weakest tooth of the other contacting pair also to a stress sufficient to cause permanent set. The amount of this permanent set will always be great enough to cover up the effect of any permissible normal pitch error or of tip relief allowance. It is feasible to develop a method of pre-determining the static strength of a gearset by the use of this principle in combination with a suitable factor of safety.

Fig. 1 shows a pair of equal 20-deg. involute, full-depth gears in mesh, for convenient reference the lower one will be called the "pinion" and the upper the "gear." Figs. 1 and 2 show the pinion tooth in its weakest position (load at the tooth tip) and the gear tooth in its strongest position (load near the tooth base), with the contact at *B*. When the contact is at *A* (Fig. 2) this relation is reversed; the pinion tooth is then in its strongest position and the gear tooth in its weakest position. From an examination of Figs. 1 and 2 it is evident that as the gears rotate and the contact of a tooth pair moves from point *A* through *P* to *B*, the pinion tooth strength decreases from a maximum at *A* to a minimum at *B*; and at

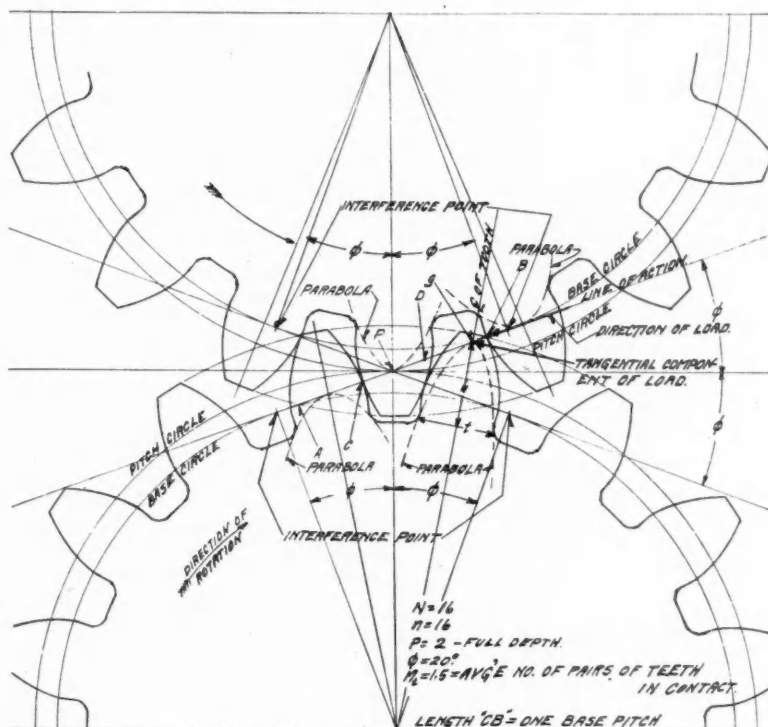


Fig. 1—Standard 20-deg., full-depth tooth gears

the same time the gear tooth strength increases from a minimum at *A* to a maximum at *B*. In general this is characteristic of all gears.

The strength of any single pair of contacting teeth of the gearset for any given position of the contact along the line of action ACPB is the strength of the tooth that happens to be weakest in that position—be it a gear or a pinion tooth. For example, when the contact is at *C* in Fig. 1, the pinion tooth strength in this position is greater than that of the gear tooth in this position; hence the net useful strength of the tooth pair making contact at *C* is the strength of the gear tooth in this position. The strength factor ($t^2/6h$) of the pinion tooth can be determined by the constant-strength parabola method for successive positions of the contact along AB, the value of the factor then referred to the pitch circle by multiplying by the ratio of the radius of action to the pitch radius, and the result plotted as ordinate in Fig. 3 at the proper point along the line AB. AB in Fig. 3 is laid off proportional to the effective length of the line of action AB in Figs. 1 and 2. A curve drawn through the points obtained by plotting these ordinates gives a representation of the variation in strength of any single pinion tooth as the contact moves from *A* to *B*. Similarly the curve $m'm'$ is drawn in Fig. 3 to represent the strength variation of any single tooth of the gear. The net useful strength of any tooth pair is then the minimum strength of the pair in successive positions of the contact along AB in Figs. 1 or 2; this is represented by



by
W. K.
Toboldt

"Stock" Cars Expected to Push Fast Field in Indianapolis 500-Mile Race

PRACTICALLY every type of automobile except the Diesel has entered the lists for the Indianapolis race, May 30. Front drives, rear drives and four-wheel drives; four, six, eight and sixteen-cylinder engines; engines of the in-line type and the V-type; and a two-cycle job will attempt to qualify.

Edsel B. Ford, president of the Ford and Lincoln companies, will be pace-maker, driving a Lincoln, according to race officials.

Perhaps the most important feature of this year's race is the fact that several passenger-car factories have officially backed several entrants. The Studebaker Corp. will try to qualify a five-car team and the Hupp Comet has the support of the Hupp Motor Car Corp. Juan Gaudino of South America and George Howie have elected to use revamped Chrysler engines, while a modified Oakland V-8 was chosen by George S. Garrard.

The two Hudson Specials have modified Hudson engines, and pre-race dope is that Buddie Marr, the entrant, received considerable help from the Hudson Motor Car Co. in the preparation of these jobs.

The Coleman Motors Corp. and the Four-Wheel Drive Auto Co., both truck concerns, have entries.

Last year the lowest qualifying speed was 96.871 m.p.h., with an arbitrary minimum of 90 m.p.h. This year, however, cars must show a speed of at least 100 m.p.h. to qualify. The entrance fee was raised from \$100 to \$200. In spite of these extra barriers, 72 cars entered, from which the forty fastest jobs will be selected to run in the Decoration Day classic.

This is the third year of a displacement limit of 366 cu. in., and superchargers banned. In 1930 the track record of 101.13 would have been broken had it not been for a pile-up of six cars causing the field to be slowed up for nearly five minutes. This year the cars entered undoubtedly will be fast enough to break Pete De Paolo's record. History is in the making.

Rules applying to the cars were the same as last year. Displacement limited to 366 cu. in., weight restricted to 7½ lb. per cu. in. of displacement with 1750

lb. set as the final minimum, and a riding mechanic required.

Of the 72 cars entered this year, ten are four-cylinder jobs, two are sixes, fifty-five eights and four are sixteens. Three four-wheel drive cars will add much interest if they all qualify.

Drivers generally concede that the front-wheel drive has the advantage over the rear-wheel drive on the Indianapolis track, particularly if the track gets slippery.

Theoretically the four-wheel drive has the advantage of greater traction as the power is divided among four wheels rather than two, with a consequent reduction in the amount of wheel spinning while accelerating. Naturally this results in improved acceleration but only at speeds where a two-wheel drive car, with the same power, would spin the wheels. This speed is less than 50 m.p.h. and the turns at Indianapolis are taken at speeds well above that figure. Undoubtedly all of the race cars at Indianapolis will be capable of spinning their wheels at that speed.

Pre-race opinion of some of the drivers is that the tendency to skid would be reduced and that a four-wheel drive would handle better, particularly on slippery portions of the track.

Each of the four-wheel drive cars has an eight-cylinder power plant. The cars entered by Harry Miller and the Four-Wheel Drive Auto Co. are similar and use eight-in-line engines. The Coleman entry is powered with two four-cylinder Miller engines, placed side by side, and connected to the transmission by a gear train. The powerplant is the same as used in the Coleman front-drive last year.

The four sixteen-cylinder jobs are not new to the track, having seen service previous years. The Sampson Special, with Lou Meyer at the wheel, finished fourth in 1930, averaging 95.253 m.p.h. Last year Meyer, with the same car, was forced out at the end of 67 laps with an oil leak. However, Aldan Sampson and Riley Brett did a lot to improve this car during the winter months.

Saulpaugh's sixteen-cylinder Miller was driven last year by "Shorty" Cantlon but lasted only two laps, being forced out by a burned rod. Saulpaugh, incidentally, holds the one-mile dirt-track record.

Leon Duray's two-cycle sixteen-cylinder creation was at the track for the first time last year, qualifying at 103.131 m.p.h. and is a fast automobile. The overheating which forced him to the pits in 1931 was traced to faulty water pumps. With improved circulation and an alteration to the valve ports, the job is faster than before.

The Goldberg entry, which arrived at the track in 1931 about 5 minutes too late to qualify, is built up of two Cooper Special engines placed side by side. In 1931 this car showed plenty of speed at Altoona, but cracked up and was completely rebuilt for Indianapolis.

In addition to driving the Sampson Special, Louie Meyer has entered the Jadson Special, which will be driven by Bob Carey, holder of the 100-mile record at Oakland, Cal. This is the same car that Myron Stevens and Meyer drove into fourth place last year but is now fitted with larger blocks, bringing the displacement up to 249 cu. in.

Harry Hartz again enters two cars, both front drives. The job to be driven by Billy Arnold is the one he wrecked in 1931 after leading the pack for 400 miles. The other Hartz entry, which is scheduled to be driven by Cliff Durant, has a 182 cu. in. eight-cylinder Miller engine as compared to the 151 cu. in. engine used by Arnold. The design of the front-drive on Durant's car is similar to the Cord's.

(Turn to page 767, please)

Details of Indianapolis Cars

ENTRANT	CAR	DRIVER	No. CYLS.	BORE AND STROKE	DISPLACEMENT Cu. In.	ENGINE MAKE	CARBURETOR	IGNITION	DRIVE
Harry Hartz	Miller-Hartz Spec.	Billy Arnold	8	2 5-8 x 3 1-2	151	Miller	4-Miller	Bosch	Front
Harry Hartz	Miller-Hartz Spec.	Cliff Durant	8	2 7-8 x 3 1-2	182	Miller	4-Miller	Bosch	Front
Juan A. Gaudino	Golden Seal Spec.	Juan A. Gaudino	8	3 3-8 x 5	358	Chrysler	4-Winfield	Bosch	Rear
J. B. McPherson IV	McPherson-Kalen Spec.	George Kalen	8	2 5-8 x 4 3-4	206	Duesenberg	4-Winfield	Bosch	Rear
Brisko-Atkinson	Brisko-Atkinson Spec.	Frank Brisko	8	2 5-8 x 3 1-2	151	Miller	4-	Bosch	Front
George W. Howie	Howie Spec.	George Howie	8	3 3-8 x 5	358	Chrysler	4-	Bosch	Rear
Alden Sampson Spec.	Sampson Spec.	Louis Meyer	16	2 5-16 x 3	201	Sampson	8-Winfield	Bosch	Rear
Russell Snowberger	Hupp Comet	Russell Snowberger	8	3 1-2 x 4 3-4	366	Hupp	4-Winfield	Bosch	Rear
Mikan-Carson-Gardner	Allegheny Spec.	Wm. Speed Gardner	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Mallory	Rear
Boyle Motor Products	Boyle Valve Products Spec.	Lou Moore	8	3 3-8 x 3 3-4	268	Miller	4-Winfield	Bosch	Rear
Boyle Motor Products	Boyle Valve Products Spec.	Wesley Crawford	8	2 13-16 x 2 3-4	137	Duesenberg	4-Winfield	Bosch	Front
Buddie Marr	Hudson Spec.	Chester Miller	8	3 010 x 4.5	254	Hudson	4-Winfield	Bosch	Rear
Buddie Marr	Hudson Spec.	Al Miller	8	2 7-16 x 3 1-8	233	Hudson	4-Winfield	Bosch	Rear
Leon Duray	Unnamed	Leon Duray	16	2 922 x 4	215	Duray	4-Winfield	Bosch	Front
Paul P. Bost	Empire State Spec.	Paul Bost	8	2 5-8 x 3 1-2	151	Miller	4-Winfield	Bosch	Rear
B. L. Schneider	Bowes Seal Fast Spec.	Lou Schneider	8	2 5-8 x 3 1-2	151	Miller	4-Winfield	Bosch	Rear
B. L. Schneider	Bowes Seal Fast Spec.	Bill Cummings	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Studebaker Corp.	Studebaker Spec.	Tony Gulotta	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Studebaker Corp.	Studebaker Spec.	Luther Johnson	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Studebaker Corp.	Studebaker Spec.	Cliff Bergere	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Studebaker Corp.	Studebaker Spec.	Pete Kreis	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Studebaker Corp.	Studebaker Spec.	Wm. Cantlon	4	4 1-16 x 4 1-4	220	Miller	2-Winfield	Bosch	Rear
William Cantlon	Lion Head Spec.	Bob Carey	8	3 1-4 x 3 3-4	249	Miller	4-Winfield	Bosch	Rear
Louis Meyer	Jadson Spec.	Bob Carey	8	3 1-2 x 4	308	Miller	4-Winfield	Bosch	4-Wheel Drive
Four-Wheel Drive Auto Co.	Russo Spec.	J. E. Russo	8	2 896 x 5.00	263	Duesenberg A	2-Winfield	Bosch	Rear
George A. Henry	Buddy Callaway	Buddy Callaway	6	3 1-2 x 6	346	Duesenberg	4-Winfield	Bosch	Rear
George B. Hall	Duesenberg Spec.	Ira E. Hall	8	2 895 x 4.625	243	Oakland V8	4-Winfield	Bosch	Rear
George S. Garrard	All American Spec.	Fred Merzney	8	3 7-16 x 3 3-8	251	Miller	4-Winfield	Bosch	4-Wheel Drive
Coleman Motors Corp.	Coleman 4-Wheel Drive Spec.	Gene Haustein	4	3 3-4 x 4 1-8	365	Ford	2-Winfield	Bosch	Rear
Fronty Sales Co.	Finnerman Spec.	Barney McKenna	4	4 x 4 1-2	226	Duesenberg	4-Winfield	Bosch	Rear
Andrew Finnerman	Bowes Seal Fast Spec.	Deacon Litz	8	3 x 4	226	Morton & Brett	3-Winfield	Bosch	Rear
John Rutner	Guiberson Spec.	Leon DeHart	4	3 3-4 x 4 1-8	183	Miller	2-Winfield	Bosch	Rear
Ethel MacMorton	Shafer Eight	Arval Brunniere	8	3 1-16 x 4 5-8	273	Buick	4-Winfield	Bosch	Rear
Allen Guiberson	Richards Spec.	Phil Shafer	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Phil Shafer	Richards Spec.	Roy Painter	8	2 889 x 4.5	237	Hudson	4-Winfield	Autolite	Rear
Lupasa Co.	Richards Spec.	Freddie Winnai	8	2 3-4 x 5 3-32	150	Duesenberg	4-Winfield	Bosch	Rear
Wm. H. Richards	C. B. Spec.	George Weingerter	8	2 6 x 4.75	202	Duesenberg	4-Winfield	Bosch	Rear
Tullio Gulotta	Duesenberg Spec.	George Weingerter	8	2 7-8 x 5	260	Duesenberg	Winfield	Bosch	Rear
Henry W. Maley	Folly Farm Spec.	Jack Meritz	8	3 1-8 x 4	245	Duesenberg	Winfield	Delco	Rear
Charles Burgert	Leipert Miller Spec.	Malcom Fox	8	3 3-16 x 3 1-2	223	Clemons	2-Winfield	Bosch	Rear
George Weingerter	Hoosier Pete Spec.	Billy Winn	8	3 1-8 x 3 3-4	230	Miller	4-Winfield	Bosch	Rear
E. P. Stair, Jr.	Duesenberg Spec.	Wilbur Shaw	8	2 3-4 x 3 156	150	Duesenberg	4-Winfield	Bosch	Rear
Jack Meritz	Gilmore Spec.	Al Gordon	4	4 1-16 x 4 1-4	220	Miller	2-Winfield	Bosch	Rear
Stewart Leipert	Gilmore Spec.	Fred Frame	8	4 1-16 x 4 1-4	220	Miller	2-Winfield	Bosch	Rear
F. E. Clemons	Harry Miller Spec.	Babe Stapp	4	4 1-16 x 4 1-4	220	Miller	2-Winfield	Bosch	Rear
Ralph Hepburn	Harry Miller Spec.	Ernie Triplett	8	2 5-8 x 3 1-2	303	Miller	8-Miller	Bosch	4-Wheel Drive
C. D. Harrison	Harry Miller Spec.	Bryan Saulpaugh	16	3 875 x 4.125	194	Miller	2-Winfield	Bosch	Rear
Fred Frame	Harry Miller Spec.	Milt Jones	4	3 875 x 4.125	194	Miller	2-Winfield	Bosch	Rear
Art Spark-P. Weirick	Miller Special	L. L. Corum	8	2 9 x 5	264	Duesenberg	4-Winfield	Bosch	Rear
Bess White	Duesenberg Spec.	Joe Huff	16	2 3-16 x 3	182	Miller	8-Winfield	Bosch	Front
Harry A. Miller	Duesenberg Spec.	Zeke Meyers	8	2 65 x 3	132.5	Miller	4-Winfield	Bosch	Rear
Harry A. Miller	Duesenberg Spec.	Milt Marion	8	2 7-8 x 5	260	Duesenberg	4-Winfield	Bosch	Rear
Milton Jones	Brady & Nardi	Al Aspen	8	3 1-2 x 4 3-8	337	Studebaker	4-Winfield	Bosch	Rear
Alvin R. Jones	Brady Spec.	Doc Mackenzie	8	3 1-2 x 4 1-8	159	Miller	2-Winfield	Bosch	Rear
Kleinschmidt-Rigling	Brady Spec.	Sam Ross	8	3 1-4 x 4 1-2	298	Lycoming	4-Winfield	Bosch	Rear
F. P. Duesenberg	Brooks Remo Spec.	Marion Trexler	4	3 3-16 x 4 1-2	288	Duesenberg	4-Winfield	Bosch	Front
Aiken Howard	Samcliff Spec.	Claude Burton	8			Duesenberg	4-Winfield	Bosch	Rear
S. C. Goldberg	L. B. Spec.	Jimmie Patterson	8			Duesenberg	4-Winfield	Bosch	Rear
M. A. Yagle	Duesenberg Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Virgil O. Williams	Brady & Nardi		8			Duesenberg	4-Winfield	Bosch	Rear
Steve Gregory	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
R. T. Brady-G. Nardi	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Ray T. Brady	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Wm. Yahr	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Albert H. Walker	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Arthur Chevrolet	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Harold Brooks	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Sam Greco	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Louis A. Blair	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear
Louis Katz	Brady Spec.		8			Duesenberg	4-Winfield	Bosch	Rear

Only three years ago chromium plating was not the controlled process it is today. Even large industrial installations were few, and were installed under the vigilant supervision of the highest technical authorities in the art. Now, Mr. Geschelin points out, the art is so advanced that a compact chromium plating set-up may soon be part of the equipment in every tool crib. Some of the reasons why this would fit into plant economy are shown in the following article

Chromium Plating Cutting Tools Their Wear-Life and Saves

HERE and there in the automotive industry and its many neighbors, considerable private activity has been going on in the chromium plating of cutting tools. Whether you are prepared to believe it or not, one outstanding industrial equipment manufacturer reports an increase in life of 22 times for chrome-plated drills, while the life span of reamers is said to have increased about 25 times by chromium plating in a large motor car plant.

Judging by the interest in this development in many quarters, both here and abroad, a wider acceptance of this new principle in machine shop practice seems to be close at hand. But before this happens, certain questions of procedure will have to be cleared up and certain prejudices discarded. Remember that the chromium plating of cutting tools has been attempted for a number of years and that as far back as 1928 Dr. Blum⁽¹⁾ reviewed its history and possibilities.

Why then has this development lagged? There have been a number of good reasons, most of which no longer hold. For instance, back in 1928-29 electroplating was not the controlled process that it is today. Much more is known now about plating and the getting

of desired effects. Moreover, the explanation for many failures is known and may be applied successfully to current problems.

In view of the genuine interest on the part of many people with whom the writer has talked recently, we have concluded an investigation of "hard" or, as it is often referred to, "industrial" plating which forms the basis for this article. As might be expected, many people swear by it; some swear at it. Yet a large group of important companies has used chromium-plated cutting tools for a number of years with signal success. Records of performance based on case studies by a reliable source are given elsewhere in the article.

Now, then, if success has crowned the efforts of so many experimenters, why can't the results be duplicated throughout the metal-working industry? Indications are that they can be, provided the work is carefully done under controlled conditions.

To date one serious drawback has been the lack of proper plating facilities. Although the larger automotive plants have their own electroplating equipment, hundreds of smaller plants are not so fortunate. But things have changed. In practically every large city in the United States there is at least one commercial electroplating plant with complete facilities and the specialized knowledge so essential to successful plating. Furthermore, some time in the very near future we may expect to see on the market a small, compact electroplating machine complete in all respects and specially designed for the tool room or tool crib. When that happens electroplating will be within the reach of the smallest machine shop.

To better appreciate the whys and wherefores of the chromium plating of cutting tools, let us see what authorities have to say about the advantages of chromium plate. Lieut. A. Willink said in a recent talk⁽²⁾ that "chromium plate has unique properties which have attracted widespread interest. They are: its hardness and wearing qualities; its resistance to deterioration and discoloration under ordinary atmospheric conditions, also under conditions where smoke and fumes exist, such as in large cities; its use in conjunction with other metals to prevent corrosion of iron and steel; its lubricating qualities (it being a well-known fact that chromium-plated surfaces give the lowest known coefficient of friction) and the diffi-

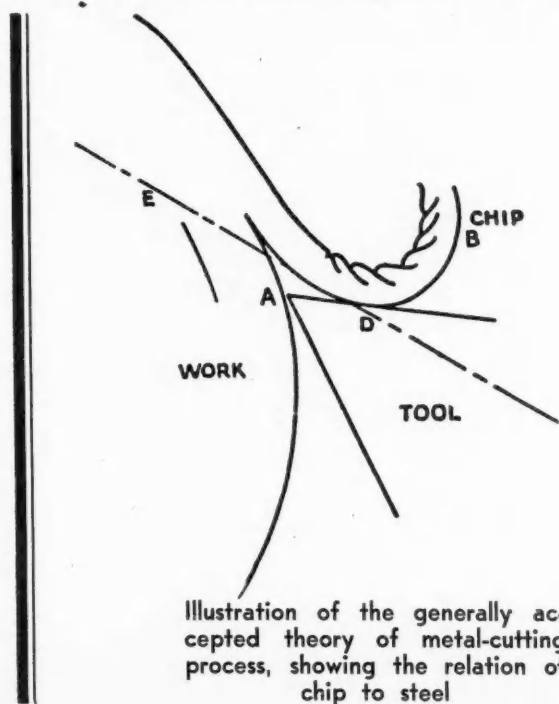


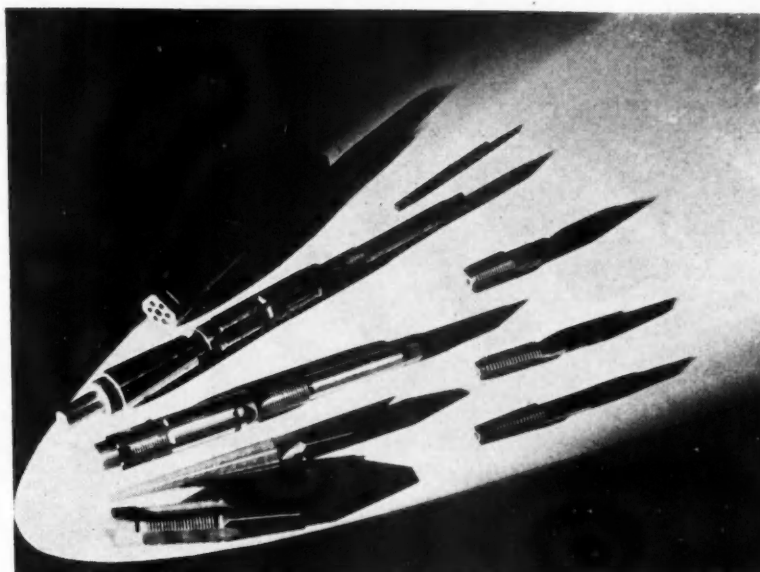
Illustration of the generally accepted theory of metal-cutting process, showing the relation of chip to steel

¹Chromium Plating for Wear Resistance, paper read by W. Blum at the 1928 annual meeting of the ASME.

²Chromium Plating for Wear Resistance, paper read by A. Willink at the general meeting of the Electrochemical Society, April 23, 1932.

by
Joseph Geschelin

Tools Multiplies Many Man-Hours



Chilton Photo

culty of wetting a chromium-plated surface."

Dr. William Blum, noted research worker of the Bureau of Standards, in a recent talk at the Franklin Institute ⁽³⁾ stressed the following properties of chromium: 1. Extreme hardness. 2. Resistance to wetting by virtue of an oxide film which forms on the surface of the plate. 3. Low coefficient of friction, especially when a lubricant is present. 4. Resistance to tarnish.

Combine these advantages in a properly designed cutting tool for carefully selected applications and you get some striking advantages. In the first place, due to the remarkable wear-resistance of chromium, the tool should last longer. Next is the salvage feature, since some tools may be replated almost indefinitely. Moreover, aside from actual economy is the fact that a chromium-plated tool or gage will achieve better accuracy because its dimensions do not change as rapidly.

Another source of economy which should not be overlooked is the saving due to less frequent break-downs with their consequent tool setting. This is particularly noticeable in the case of multiple drilling machines, gang slitting saws, etc.

Both the user of the tool and its manufacturer may derive considerable advantage from the decorative value of the plated surface. Right along this line a French engineer, in a paper read recently before one of the French scientific societies, emphasized the psychological effect of a bright, shiny, chromium-plated tool. He suggested that the workmen and tool crib attendant would consciously or unconsciously give it much better treatment; would be quite likely to keep it cleaner and handle it with much more care.

Out of the mass of available material we find that the most successful applications of chromium-plated tools have been in the cutting of non-metallic materials, non-ferrous metals and cast iron. Although some work has been done with steel very little factual material is at hand. In fact the investigator in this field is seriously handicapped because the users of these tools have no historical data to offer. However, it seems quite likely that applications in the field of non-ferrous metals and steel may be extended with the help of our present knowledge of plating control and the proper treatment of the base metal.

Perhaps the best way of showing the range of appli-

cation is to list some of the known types of tools that have been successfully plated. Table 1 is based on reports from many of the larger users.

These types of small tools have been chromium plated with success: 1. Reamers. 2. Burnishers. 3. Broaches. 4. Arbors. 5. Plugs and ring gages. 6. Bushings. 7. Drawing dies. 8. Lathe centers. 9. Tool tips. 10. Twist drills. 11. Slitting saws. 12. Sewing machine and knitting needles. 13. Files. 14. Thread chasers. 15. Porcelain dies.

For an explanation of the role chromium plating plays in the cutting of metals and other materials, let us consider its relation to a popular theory of metal cutting which was discussed in an article ⁽⁴⁾ by the writer last year. Consider Fig. 1. The theory supposes that the chip "B" is wedged or split off ahead of the edge of the tool and has a bearing on the rake of the tool at "D." The bearing action at this point is like that in any other bearing since we have two metal parts in moving contact. However, conditions differ from those in the ordinary moving bearing in many respects. For example, the area of the bearing surface is very small in proportion to the load. A high temperature is generated by the plastic flow, and the deformation of the metal as well as this heat has a repellent action on most lubricants.

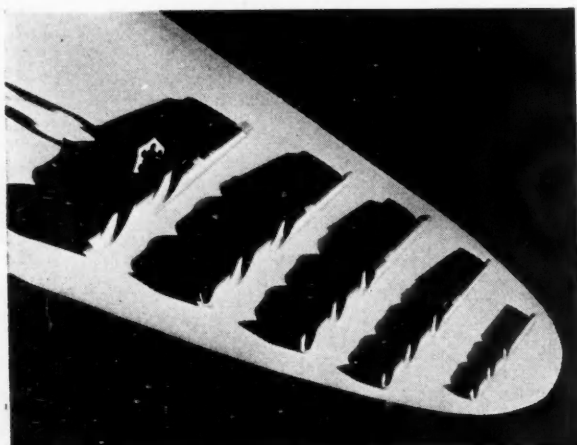
What happens when the rake surface of the tool is chromium plated? In the first place the friction between the heavily loaded chips and the top of the tool is greatly decreased by the lubricating effect so peculiar to the chromium-plated surface.

Then there is evidence to show that one of the most useful effects in the cutting of non-ferrous metals is in reducing the tendency for the chip to weld or stick on the tool. Obviously, wherever the metal does weld there is a cratering effect which not only wears down the tool but also affects the development of the chip.

R. L. Templin, chief engineer of tests of the Aluminum Co. of America, said in recent correspondence, "We did in fact recommend this procedure (chromium plating) in some of our sales publications a number of years ago. We have found that the chromium plating on the top surface of cutting tools very much reduces the tendency for metal to stick on the tool. Such tools,

³ The Status of Chromium Plating, by William Blum, Jour. of the Franklin Institute, Jan., 1932.

⁴ Use of Proper Cutting Fluids Will Lead to Economies, by Joseph Geschelin, *Automotive Industries*, Feb. 14, 1931.



Chilton Photo

Chrome Plated Tool Performance

(Based upon case studies by a reliable source)

Twist Drills

A large manufacturer in Newark, N. J., has been using chromium plated drills for very hard cast iron that they are unable to drill with unplated drills.

General Electric Co., Pittsfield, Mass., reported in 1929 that they obtained from 1 to 3½ times the service with chromium plated drills.

Paper and Textile Machine Co., Sandusky, Ohio, has been having very good success with plated drills on brass rolls. On hard rubber they find an increased life of 50 per cent.

Large Eastern equipment maker in experimenting over a period of six months with approximately 200 drills varying in size from ¼ to 1½ in. diameter, stated that due to chromium plating they obtained 22 times the service expected under the same circumstances from unplated drills. These drills are said to have been used on a large variety of substances, cast iron, steel (high and low carbon), brass, aluminum, nickel alloys, slate, etc.

Reamers

General Electric Co. and Brown & Sharpe reported in 1929 that they were obtaining very good results with chromium plated reamers. Since then both concerns have been continual users of chromium plated reamers.

Large electrical organization reported 6 to 7 times the service from chromium plated reamers used in lots of 25 for cleaning up the holes for telephone jacks in their switchboards.

Prominent motor car manufacturer reports that reamers used in cleaning up the holes in aluminum crankcases are treated as follows: The reamer is first ground under-size .002 in. to .003 in., and then chromium plated until they are .002 in. to .003 in. oversize, then ground back to size. After giving 25 times the service of unplated reamers they are worn below their tolerances but not through the chromium. They are then stripped and reapiated as before.

Files

General Electric Co. reported 10 to 14 times the service from chromium plated files in 1929.

A saw manufacturer reported in 1929 that chromium plated files gave 2½ times the service on steel of hardness up to Rockwell 45 degrees.

Well known machine tool builder has been using chromium plated files since 1929 and for the past year there has been a standing order in their plant that all files must be plated before issuing to the shop. They report from three to nine times the life.

Eastern Machine Screw Co., New Haven, Conn., reported in 1929 that chromium plated files gave them from 3 to 8 times the service of unplated files.

Wallace Barnes, Bristol, Conn., report from 4 to 5 times the service when used on medium carbon steel strip.

Thread Chasers

Thread chasing dies used in threading aluminum run 15 days against 4 hours for unplated chasers and allowed

however, as are resharpened by grinding on the top surface would need to be replated after each grinding. This involves a procedure which most machine shops are unwilling to contend with. On the other hand, where tools are resharpened on their front surfaces rather than on their top surfaces, one good job of chromium plating should last for many resharpenings of the tools. We have found that chromium-plated files work better than the ordinary type when used on aluminum and its alloys. Chromium-plated twist drills showed slight advantages but not as much as tool bits such as those used for lathe, shaper and planer purposes."

Dr. Blum stresses the same point in recent correspondence, saying that "very thin chromium plating has sometimes been beneficial in reducing the tendency toward 'seizing' during the cutting."

Where chromium is applied directly on cutting edges, it offers specifically resistance to wear and abrasion by virtue of extreme hardness, thus providing a cutting tool which fits in somewhere between tool steel and the harder cutting materials which have been developed in recent years. Although plating the cutting edge offers the disadvantage noted by Mr. Templin, namely, the necessity for replating after the first or subsequent regrindings, this is a problem only where plating facilities are not at hand.

A mighty convincing explanation of phenomena which may have had a lot to do with failures in the past was given by Willink (°) last month. He

says in part, "The existence of hardening strains in hardened steel is a matter of quite common knowledge, and, if a hardened steel under these conditions is subjected to the chromium bath, the effusive evolution of hydrogen causes hydrogen embrittlement in the steel, with a consequent formation of large cracks in the steel being plated, rendering the article plated absolutely useless. This is more particularly true in high current densities, as the hydrogen is evolved at a faster rate and the solution at this temperature is incapable of dissolving as large a proportion. Therefore, when hardened steel parts are used, they should be as free as possible from hardening strains. When chromium plating steel gages, far greater success can be obtained by using a softer steel.

"Another consideration, which holds particularly in the case of steel dies or other parts subjected to impact, is that the physical properties of the basic metal must not allow deformation due to this impact. Considerable difficulty was experienced with certain chromium-plated steel draw dies which have a shorter life than the unplated dies. An investigation showed that the face of the die was deformed, causing the chromium plate to crack and scratch the work. A different type of steel was resorted to, to eliminate this deformation, and the chromium plate has been successful ever since."

Needless to say, one of the moot questions is that of the thickness of plate essential to the success of the particular application. It is practically impossible

[°] See ref. 2.

doubling speed of machine with consequent reduction in piecework rate of \$0.30 per 100.

Chromium plated bolt threading dies produce 325,000 pieces against average of 200,000 for unplated dies working on steel bolt stock.

Plated chasers used for threading steel bolts give 5 times the production between grindings.

Broaches, Cutting

Chromium plated broaches give 25 to 50 per cent greater production on cast iron and steel. (P.M.C.Co. 10-7-29.)

Chromium plated broaches used on aluminum have 5 times greater life. (Same.)

Broaches, Burnishing

A bar which normally produces 900 parts gives 4000 pieces when plated. Another bar with normal production 150 pieces gives 1200 when plated. (4-8-30.)

Roll-Threading Dies

Chromium plated thread rolling dies produced 1,750,000 pieces against 1,000,000 pieces for unplated dies on the same job. (10-4-29.)

Metal-Forming Dies

Chromium plated dies used in stamping small brass parts average three times the production of unplated dies. (9-10-29.)

Chromium plated die used for swaging heads of carriage bolts produced 500,000 bolts and is still in use, against average production of 200,000 bolts for unplated dies.

Forging Dies

Die used for forging the "thimble" for holding the tubes in a water tube boiler to the end frame, unplated average 9000 pieces—plated average 22,000 pieces. (10-9-29.)

Drop-forging dies for shallow pieces show an increase of production of 40-50 per cent when chromium plated. (1-27-30.)

to generalize on this since the right thickness must be determined experimentally, not only with respect to the tool itself but also with a view to operating conditions.

Here is one example quoted from recent correspondence: "Only a chromium strike is attempted, using about 0.0001 in. thickness plate. On reamers stock is left on the O. D. of the tool so that after plating, subsequent grinding removes the chromium plate from the O. D., leaving a plate only on the cutting face of the flute. He (the tool manufacturer) also mentioned the fact that after about a year's experimenting they have finally succeeded in producing chrome-plated taps, the threads of which are ground after chrome plating. He further stated the fact that successful results have been obtained on the use of chrome-plated slitting saws and also chrome-plated thread gages. He emphasized the fact that in order to get good results it was necessary to install the last word in chromium-plating equipment, including electrical controls for temperatures, etc."

The following is taken from recent correspondence with the Ex-Cell-O Aircraft & Tool Corp.: "Applications where chromium plating is giving the best performance are on such parts as shafts, bearings, all types of gages, centerless grinder spindles, centerless grinder guides, drawing dies, forming dies and similar parts. It has been found that chromium plating works very successfully on the burnishing buttons for burnisher broaches, also on boring bars and reamers. The pilots are chromium plated which permits the use of

common carbon steel instead of high-priced tungsten steel which is required for the body of the cutter or reamer. In this particular case the chromium plating gives an extremely hard surface on the pilot surface which is equivalent in life to that of the body of the boring bar or reamer."

Here is another current report: "The following is a summary of the successful chromium plating applications which have been introduced at the Western Electric Co.'s Kearny Works: 1. Files. It has been found, as the result of extensive tests, that the application of a coat of chromium approximately 0.0005 in. in thickness will increase the life of files about four times. This is because of the increased resistance to abrasion offered by the plating on the teeth. 2. Plug gages. The effective life of plug gages has been increased approximately 10 times by the use of chromium plating. After the chromium plating becomes worn, it is practical to strip off the remaining electro-plate and replat the gages."

Apart from cutting tools, considerable success has been reported in the plating of dies for electrical porcelain products and molded plastics. In the textile industry, some of which may be considered as part of the automotive industry, plating has achieved signal success on printing and calendering rolls and parts of machines.

Ford News for Jan. 15, 1930, carries the following comment concerning chromium-plating practice: "On tool fixtures such as multiple heads, grinding spindles, drill press spindles and similar steel parts, some cold heading dies and sliding surfaces where friction develops, the parts will show a saving of from six to 20 times after plating. The life of gages, tools, centers and machine parts on the job is being increased many-fold."

Salvage is a field in itself. In certain plants it is customary to reclaim undersized machine or ground parts by chromium plating where the amount of added material does not exceed two to three thousandths of an inch. One large motor car company is said to have saved several thousand dollars a day in 1929 by this means.

An interesting comment on the salvage feature of plating is taken from a recent letter: "In analyzing the feature of chromium plating it can be broken down into two types of applications. First, longer life, such as in the case of gages, and, second, the salvaging of new and used parts at a material saving in cost. The latter factor plays a very important part particularly in times like these when everyone is trying to reduce manufacturing costs and make delivery in accordance with the unusually short demands requested by the customer. In the case of a production part coming through where a limited delivery time is given and a part is scrapped, it can be chromium plated and the delivery schedule held which would otherwise be impossible if new parts were started through the plant."

The electroplating of cutting tools differs in many respects from the decorative plating with which nearly everyone in the automotive industry is now familiar. In the first place, chromium may be deposited directly on the base metal without recourse to undercoats of copper or nickel. In general, the thickness of the coat will be much greater, approaching 0.002 to 0.003 in. in some cases.

Present knowledge concerning the necessary treatment of the base material, variations in thickness of the electroplate, and methods of cleaning prior to electroplating, should exert a profound effect on the growth of "hard" plating usage.

Organization and Personnel of the Lubricants Research Subcommittee May 3, 1932

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SECRETARY: Dr. H. C. Dickinson—Bureau of Standards

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W. H. Graves—Packard Motor Car Co.
W. S. James—The Studebaker Corp.
J. L. McCloud—Ford Motor Company
H. M. Northrup—Hudson Motor Car Co.
E. W. Upham—Chrysler Corporation

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Chairman: F. E. McMullen—Gleason Works
E. F. Davis—Warner Gear Company
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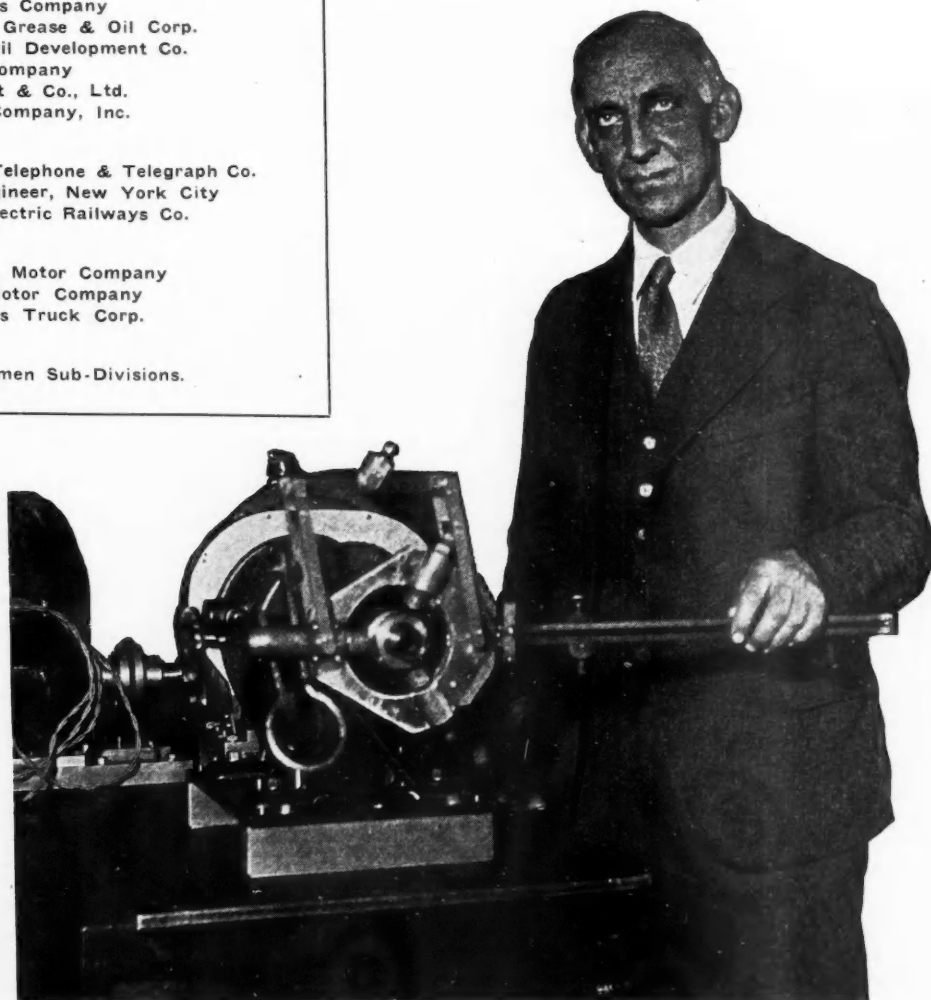
EXECUTIVE COMMITTEE

Chairman, Secretary, Chairmen Sub-Divisions.

How Much Pressure "Extreme Pressure"

THE load-carrying capacity of extreme pressure lubricants is about to be studied with an intensity and an accuracy heretofore unknown. The job is going to be done at the Bureau of Standards under the direction of Dr. H. C. Dickinson and under the supervision of the Lubricants Research Subcommittee of the Society of Automotive Engineers.

The first objective will be to develop



Dr. H. C. Dickinson, veteran S.A.E. committee worker and Chief, heat and power division, U. S. Bureau of Standards, who is Secretary of the Lubricants Research Subcommittee

is Too Much When? Lubricants Wilt

When hitting a drop of nitroglycerin with a hammer, the answer is simple.

In finding a serviceable lubricant for tremendous loads on axle gears, the instruments don't agree.

Six sub-divisions of the S.A.E.'s Lubricants Research Committee await with interest results of Bureau of Standards efforts to find a satisfactory answer.

methods and instruments by which the load-carrying capacity of these extreme pressure lubricants can adequately be measured. General Motors, Timken and others have already developed machines for this purpose, which do give an indication of the properties of the lubricant, but they can't be relied upon to check with each other; there are considerable variations in the results obtained on the various machines and all the machine results, in turn, often differ from conclusions derived by operation or service tests.

Having found this out through nine months spent in collecting and analyzing data, it is natural that the committee should focus its next major effort on trying to get a yardstick which will accurately evaluate extreme pressure lubricant properties. And it is natural, too, that it should further narrow its immediate objective to trying to gage the particular property of load-carrying capacity, since other properties of these lubricants are of no consequence if the lubricant will not stand the load.

The program, which is being financed by individual contributions from the many organizations interested in the project, will move immediately toward the objective stated in three specific steps:

(1) Measurement of the load-carrying capacity of representative types of extreme pressure lubricants with General Motors, Timken and other machines, following the procedure recommended by the designers.

(2) Correlation of these data with actual service performance.

(3) Development or recommendation of a significant and practical test machine and procedure.

The committee is already convinced that lubricants are available which are more effective in gear sets and bearings at higher loads than those at which ordinary mineral oils are effective; that many gear sets and bearings can operate at higher loads when these extreme pressure lubricants are used; and that under conditions where conventional oils and greases are satisfactory, nothing is to be gained by using extreme pressure lubricants.

But so far it is equally convinced that no adequate measuring stick exists by which these properties can



Col. H. W. Alden, Chairman of Timken-Detroit Axle Co., and Past-President of the S.A.E., who is Chairman of the Lubricants Research Subcommittee

be evaluated quantitatively and accurately. Hence, the importance of the constructive program now being put into motion.

The immense practical importance of this whole project become evident when this new program is projected on the background of pressing technical problems from which the committee and its work sprang originally about a year ago.

Increased engine power and the desire for weight reduction have been bringing axle gear tooth loading steadily nearer a point where conventional types of gear lubricant cannot be expected to give adequate protection against scuffing or rapid wear. With some designs like the hypoid and in motor trucks and buses subjected to overloading and very severe service, it has been clearly indicated that special types of lubricant are essential. Such products have been on the market for some time. Because of their exceptional load carrying ability they have come to be known as "Extreme Pressure" or "E.P." lubricants.

With the earliest use of these products it was obvious to both producer and user that some method of determining whether or not they possessed the desired degree of load-carrying ability must be devised, since the conventional method of laboratory analysis gave little or no information regarding this all-important property. From a practical standpoint the simplest and most convenient procedure was to try the lubricants in the units for which they were needed, using various methods of overloading the gears and accelerating the test work.

Such tests had the merit of approximating service conditions to a degree depending upon the procedure followed. This varied widely, some manufacturers applying very severe shock loads, while others called for
(Turn to page 770, please)

Strength Is Increased When Gears Are Designed to Have

(Continued from page 745)

contact gears may theoretically be stronger than other gears, but a question of trying to find out why the new gears are stronger than the old.

A paper on "The Design and Use of Worm-Gear Hobs" was presented by L. R. Mayo of the Brown &

Sharpe Manufacturing Co. It discussed in considerable detail a number of problems arising in the design of hobs for worm gearing and it recommended that the A.G.M.A. adopt a standard for integral shaft worms. Such worms, it was said, are often made with an undesirably small pitch diameter. The consequent diffi-

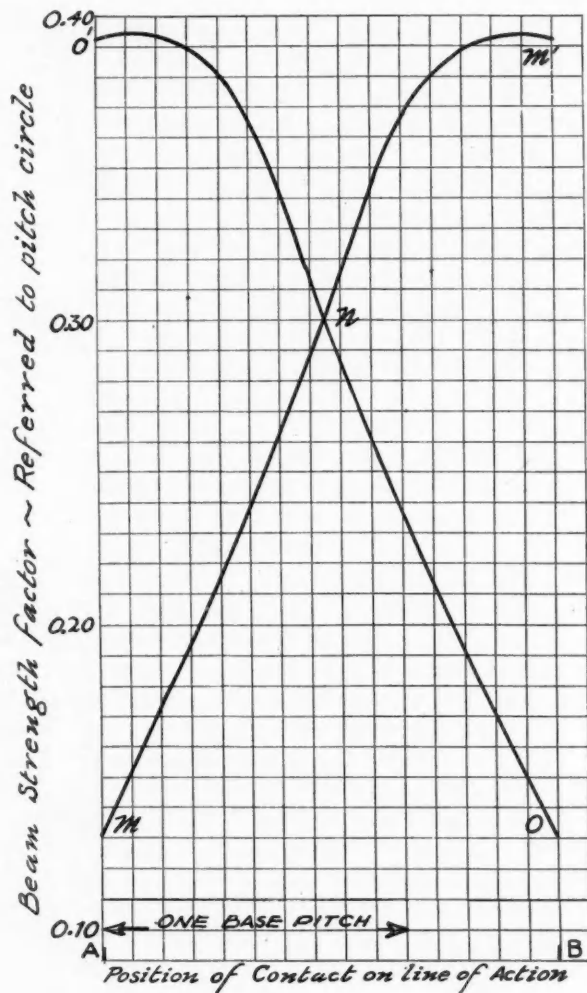


Fig. 3—Curves showing cycle of variation of tooth strength of a single pair of the teeth in Figs. 1 and 2

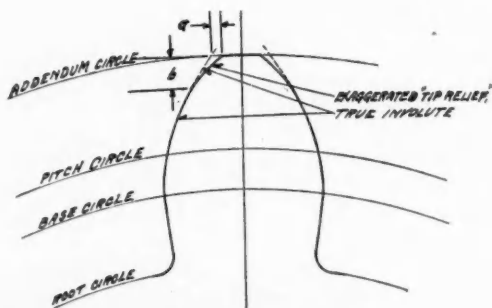


Fig. 5—Tip relief

May 21, 1932

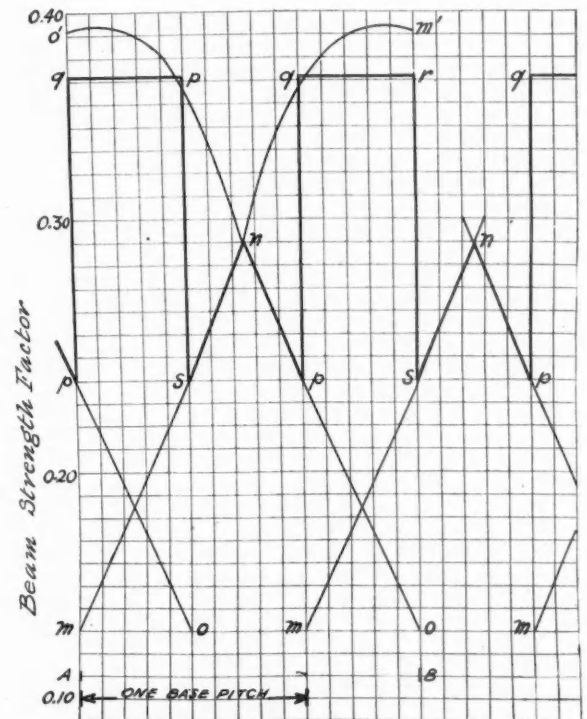


Fig. 4—Graph of combined strength of all teeth in contact. (Standard 20-deg., full-depth design)

culties were illustrated by drawings of two worms of which one had a pitch diameter $\frac{1}{2}$ in. less than the other. It was stated that the hob for the smaller worm is much weaker, the hob cost per gear will in all probability be much higher, the hobbing time will be greater due to hob weakness, good initial contact will be more

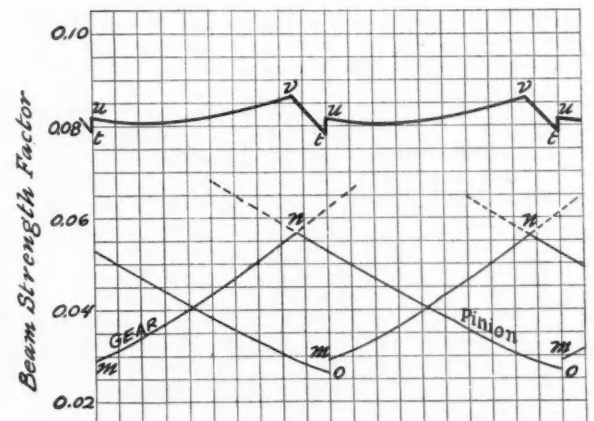


Fig. 6A—Curve of combined net useful strength of all teeth in contact in Fig. 6. (Two pairs of teeth in contact at all times)

Automotive Industries

Two Pairs of Teeth in Contact

difficult to obtain, and the maximum width of face of the mating gear is less, thus reducing the load-carrying capacity. The larger worm was designed in accordance

with the following rule for pitch diameter which appears in the latest edition of "Formulas in Gearing" by Brown & Sharpe:

$$\text{Pitch diameter} = (2.35 \times \text{axial pitch}) + 0.4 \text{ in.}$$

With the larger worm the center distance is, of course, slightly increased and the theoretical efficiency also figures out as about 1 per cent less, but Mr. Mayo said these points are unimportant when compared with the unavoidable disadvantages of abnormally small worm diameters.

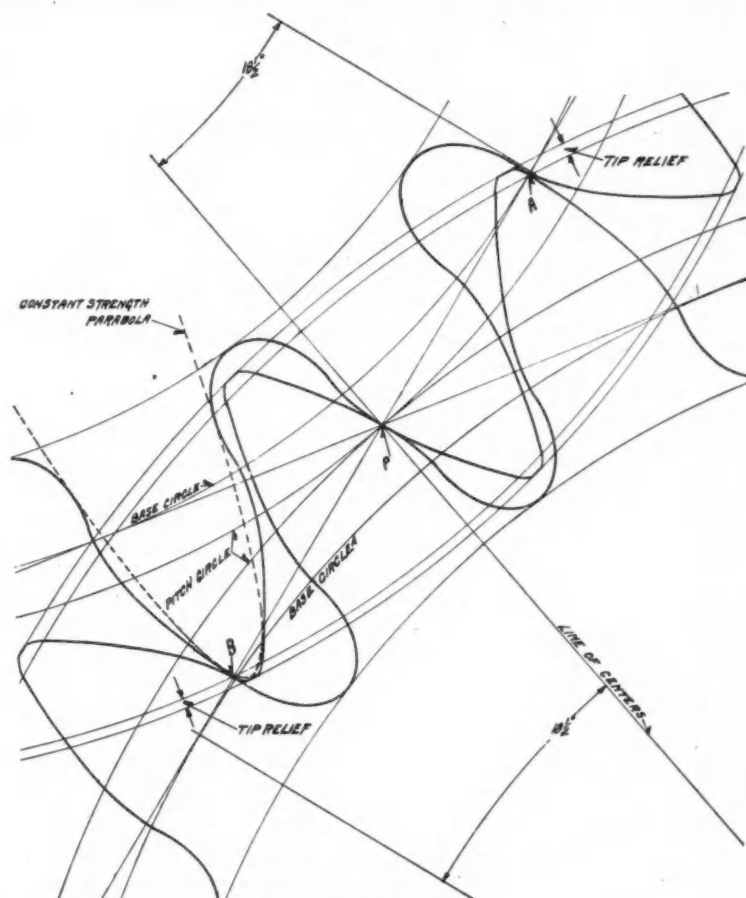
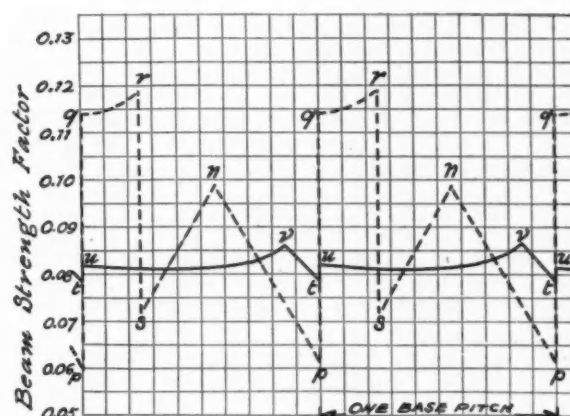


Fig. 6—Pair of gears designed to have two pair of teeth in contact constantly. (Numbers of teeth, 23 and 19; diameter pitch, 9; addendum, 0.157 in.; dedendum, 0.175 in.; press. angle, 18.5 deg.)

Below:

Fig. 7—Comparison of the tooth strengths of transmission reverse gears. Dotted line represents the strength of a pair of gears with 18 and 15 teeth with 7-9 diameter pitch, 20-deg. standard stub teeth; full line represents the strength of a pair of gears with 23 and 19 teeth, with 9 diameter pitch 18.5 deg.



Permite Resalum Offered in 3 Grades

A NEW aluminum paint known as Permite Resalum has been placed on the market by Aluminum Industries, Inc., of Cincinnati, Ohio. One of the uses for which it is recommended is as a coating for exhaust mufflers. The vehicle is a synthetic resin, and according to the manufacturers it contains no natural oils, nor any vegetable acids, for which reason bronze powder may be allowed to stand ready mixed with the vehicle for a long period without oxidation occurring. The vehicle is said to be chemically inert; to be unaffected by any of the common acids and alkalis; to be highly waterproof and unaffected by ultra-violet light. Since the resin does not oxidize on exposure to air, evaporation of the solvents is depended upon for drying of the paint. By varying the solvents the drying time can be changed to meet different requirements.

Three grades of Permite Resalum are now being offered to the trade, as follows:

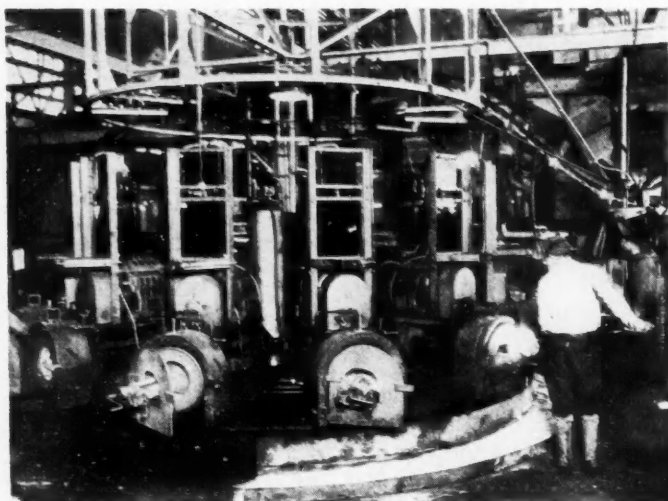
A. Heat-resisting Permite Resalum will withstand

heat up to 1100 deg. Fahr. It is quite resistant to acids and water, but not to such an extent as paints B and C.

B. Non-corrodible Permite Resalum will withstand the action of dilute mineral acids in fumes, salt water and severe moisture conditions. It will resist heats up to 800 deg. Fahr. It is recommended for use in and around chemical plants.

C. Weather-resisting Permite Resalum will withstand heats up to 400 deg. and ordinary corrosive fumes and salt air. This material is somewhat lower in price than paints A and B and is recommended where only ordinary destructive elements are found.

Each grade of Permite Resalum may be brushed, sprayed or dipped. When the material is to be sprayed, a pressure of 30 lb. p. sq. in. is used. When dipping is necessary, the material should be thinned with Permite thinner.



PRODUCTION LINES

Production Lines of the Industry No. 14

Merry-go-round on which Centrifuse brake drums are spun at the Motor Wheel Corp. The operator is in the act of pouring a charge of metal into one of the battery of centrifugal casting machines.

Paths of Progress

Further light on the effect of tungsten and tantalum-carbide tools on machine tool design is given by A. L. DeLeeuw, well-known machine designer. His discussion appears in *Mechanical Engineering* for May, 1932, under the title, "The Newer Cutting-Tool Materials." Perhaps the most interesting feature of his analysis is the comment on vibration, anti-friction bearings, and hydraulic mechanisms.

Multiple Heads

Tool Tips for April, 1932, shows an eight-spindle head which can be mounted on a standard single-spindle milling machine. This is only one angle of the service provided by the Krueger-Wayne Tool Division, which specializes in multiple-spindle heads for just about everything.

Good Lesson

The moral is, use left-hand threads sparingly. Out in good old Nyack (N. Y.) they had a fire. The brave fire-eaters worked at the plugs but couldn't budge the caps. Meanwhile, part of the building went up in smoke. When the caps were smashed off with axes, it was discovered that the thread was left-hand. That's a lesson of some kind.

Still at It

Cures for the depression are still coming strong. The latest is a wow—if only it weren't so tragic. The idea started in Canada, but they couldn't outsmart us. So the same idea was advanced in Congress by a member from Pennsylvania. Briefly, the way to cure everything is to call a moratorium on labor-

saving devices. You stop the machine and hire a crew of men to take its place. What happens to production costs, or who pays the differences apparently is unworthy of mention.

Big Meeting

The National Metal Congress coming off the first week in October will be the biggest thing this year. Its character will be broadened by the fact that our own S.A.E. Production Meeting has been made a part of the Congress. And the same is true of the A.S.M.E. machine shop practice division. Considering the nature of the program, it's a show you can't afford to miss.

Production Men

This is your page.

Any suggestions you have on new methods or kinks may be of value to men in other factories.

If you are working on some new development, we'd like to know about it—even if not for publication with your company's name.

Glue for Polishing

Credit goes to the Norton Company for an admirable job of research in the polishing field. Only those engaged in the work really know the governing role of glue. Many valuable things concerning glue, its selection, and setting up procedure are found in *Grits and Grinds* for April, 1932. The title of the article is "Selection and Handling of Glue," by Sherwood F. Prescott.

Plus Service

A Detroit foundry furnishing dies to a prominent automotive manufacturer reports that a heat-treated alloy cast-iron die employed in service involving sharp corners has given 8300 stampings, and is still serviceable as compared with a maximum of 200 stampings for a heat-treated semi-steel die.—*From Nickel Cast Iron News.*

New Infra-red Lines

Technical News Bulletin (B of S) No. 180 notes that Eastman Kodak has discovered some new infra-red sensitizers, thus making it possible to record spectra considerably beyond former limits. The infra-red spectra of 40 chemical elements now have been explored and many new lines have been discovered. These data make it possible to confirm and extend the analyses of spectral structures and thus verify present theories of atomic structure.

Double Check

Quality control means something at Chrysler. Each day, sometimes four times a day, finished parts are selected from routine inspection and taken over to the master inspection room. There the work runs the gauntlet of a searching inspection with master gages. Thus is quality assured throughout the organization.—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

Navy Buys Tools on "Work Value" Instead of Price

Drills, tool steels, saws, etc., are bought on basis of efficiency.

Value-per-dollar determines selection by Navy Department.

DO you buy on price or quality? Or do you believe that some combination of the two is the more economical? It's a tough problem when applied to small tools and supplies. Yet it's mighty important when you consider the volume of drills, cutting tools, and supplies used in any automotive plant.

A simple, intelligible and workable way of handling the situation has been established by the U. S. Navy Department. They're up against the same thing—the buying of many tools, with the added complication of bids from all over rather than from a few selected sources.

What the Navy did was to invent an index called "work value." Its effectiveness lies in its flexibility to the extent that each type of tool is judged by an appropriate basis for the index. Perhaps the best way of explaining "work value" is to show how it is established in a specific case. Quoting from Navy Dept. Tentative Specification 41B11a, dated April 1, 1932, here is the basis for awarding contracts for hack saw blades:

First, all blades are inspected for general requirements such as size, tolerances on dimensions, etc. Then each type of blade is tested to failure, cutting disks from suitable metals of specified diameter, all definitely specified for each grade of blade.

"F-6. Each blade will be tested to failure. Except when a blade is damaged accidentally, failure will be considered to have occurred when the blade cuts at an angle, cuts at an excessively slow rate, suffers breakage of body or teeth, or becomes otherwise unfit for useful service in the machine used for testing. A blade will be considered as cutting at an angle when there is any deviation of the path of the blade through the cut from the normal vertical path of the blade. A blade will be considered as cutting at an excessively slow rate when the number of strokes required to cut off the final disk is 50 per cent or more in excess of the average number of strokes required to cut off the previous disks removed by the same blade.

"F-7. Records of the tests of each blade will contain data as to the number of strokes required to cut off each disk, and the number of disks removed before failure of the blade occurred.

"F-8. The work value for any set of blades of the

same type and description will be computed from test data, as follows:

$$\begin{aligned} \text{Average strokes per disk for one blade} &= \frac{\text{Total number of strokes made before failure}}{\text{Number of disks removed before failure.}} \\ \text{Work value for one blade} &= \frac{\text{Number of disks removed before failure} \times 10,000}{\text{Average strokes per disk for the same blade.}} \\ \text{Average work value for the set} &= \frac{\text{Sum of work values of blades tested}}{\text{Number of blades tested.}} \end{aligned}$$

Note: The number of blades tested, on which the average is based, will be in accordance with paragraph F-5 of this specification.

"F-9. Blades showing an average work value below the minimum work value specified for the representative types and sizes in the following table will not be approved for Navy use until satisfactory work values are established in subsequent tests of samples of improved blades."

With "work values" as a basis, contracts are awarded to the bidder who can give the most work value for the money. Or as the specification says formally:

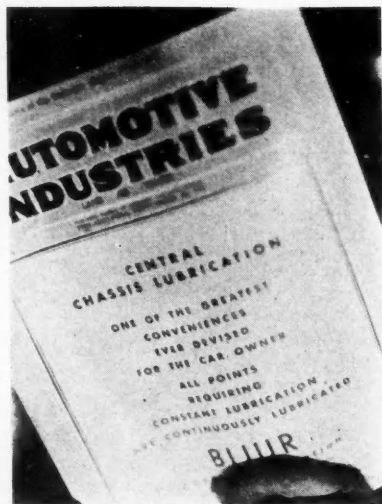
H-1. Method of awarding contracts.—Award of contract for all the classes of tool steels covered by this specification will be made in each instance to the bidder having the lowest cost per unit of work value. The cost per unit of work value is computed by dividing the average price per pound quoted by a bidder by his respective work value attained in the work-value tests described herein.

The upshot of it is, that it's cheaper in the long run to pay more for a product if it can show better returns. And that's the answer to the question coming up every day, "Shall we buy the cheapest or the best?" Only one answer will do. And a good way of arriving at it is to set up a basis so well exemplified by the "work value" yardstick.—J.G.

Representative "Work Values" as Determined by U. S. Navy

(Hack Saw Blades)

Type	Length Inches	Teeth Per Inch	Minimum Work Value
A	12	14	30
B	12	14	30
C	12	14	50
C	17	10	180
D	12	18	2,800
E	17	10	..



The Forum

Fishleigh's "Applesauce and Crust" Formula Correct, Says Richards

Editor, AUTOMOTIVE INDUSTRIES:

The Fishleigh Formula* is certainly as near correct as possible and is easily proved by analyzing the successful engineers in most lines.

His criticism of the engineers is very severe and while deserved to a great extent, he has not taken into consideration, in this article, the man higher up, the man on the board of directors in charge of engineering, whose personal vanity is hurt because he did not have a finger in the pie.

Why do so many men in executive positions think that they are liable to lose caste if they should accept a few advanced thoughts of their employees? The small number of really big men are always willing to look into all phases of an idea and not tell the engineer, off hand, that his idea is worthless or of very little value.

The great indoor pastime in practically all manufacturing plants is passing the buck in order that the individual might stand out to a better advantage, but to pass the doe is another story. The buck passer is the fellow who is trying to hold onto the doe so that his superior will think he has "it."

The doe holder wants to appear to be the fountain of all that is new and progressive but he is afraid of the new fields or any very great deviation from the beaten path and therefore adopts the attitude of adverse critic toward all schemes which he does not instantly comprehend and which he will not take time to study.

*"Big Jobs Open for Engineering Leadership," by Walter Fishleigh, p. 954, Dec. 19, 1931, *Automotive Industries*.

How can an engineer overcome these personal opinions? It would be very unethical for an engineer to go over his direct superior's head to the board of directors with a revolutionary idea, and, furthermore, it would no doubt react unfavorably on his status in the eyes of his superior, who would seize the first picayune mistake to get rid of him.

It is well known that there are some very good ideas in the minds of many of the employees in a plant that will never find the light, due to the unresponsive attitude of the management. These employees will gladly sell their ideas to others in order to

obtain a new position because they feel that here their thoughts are appreciated.

It takes a very live organization to live up to even a pretense of the Golden Rule whereby all are given an even chance. There is no need of a weak-kneed attitude in order to play fair all around. It is not a sign of weakness to admit that somebody working under your direction has evolved an idea that you never dreamed of and that it appears to be good.

No one will ever question the statement that it takes a bigger man to admit he is wrong than it takes to direct the activities of a nation. No one should ever question the statement that it takes a real he-man to give others credit for what they do.

Engineers are notoriously jealous of their ideas and each idea is a brain-child that is nourished and coddled until it seems like a part of their being. This being so, they resent it when their child is unnoticed and neglected. The way to encourage an engineer is to get him to let you hold the child and examine it, talk over its future and possibilities and make him feel your interest even though it must be diplomatically turned down in the end, but why not tell him the reason?

All employees have these brain children which if properly noticed would grow up, in many cases, to be something worth while, but let one of them be turned down off-hand by their immediate superior and the employee will never mention another idea even though it would mean the saving of thousands of dollars to the company.

Let an engineer get the name, among the financial executives, of being an exponent of advanced ideas, and he will have a hard time getting along unless the breaks are with him, but let him get one fair break and then his applesauce and crust will carry him far.

CHARLES H. RICHARDS.

Moves to Correct Apparent Abuse in State Regulation of Equipment

Editor, AUTOMOTIVE INDUSTRIES:

At the beginning of February I was informed that certain types of lamps and equipment had been barred from the Pennsylvania approved list which has recently gone into effect, and that for no lack of merit. On February 3rd I wrote to the Pennsylvania Department of Motor Vehicles at Harrisburg asking for a ruling regarding the necessity to buy new equipment to comply with the requirements, and pointed out that this was no time to enforce people to buy new lenses, etc. In reply the Commissioner enclosed one of the new acceptance lists from

which I noted that quite half of the equipment accepted on last year's inspection has been barred "because the manufacturer had not applied for approval nor had paid the necessary fees." This seemed to me to be an injustice as it left the whole matter in the hands of the manufacturers rather than in the authority of the legislature, where it belongs properly. I therefore telephoned to an automobile club and asked whether they intended to take any action. I was told that if the members showed resentment, the club would act. In order to feel out the public I therefore wrote

to newspapers in Philadelphia which followed by other paragraphs from time to time, showing that the automobile clubs had approached the Department of Highways asking for a change in the listing, both on the grounds of the ruling being ridiculous and also that it would deprive motorists of their property without due process of the law. After receiving legal opinion on this angle, I pressed for action to be taken. Happily this has been effective, for on February 23 I received a visit from an officer of the Department of Highways at

Harrisburg who informed me that they had decided to notify the 4500 inspection stations that the equipment previously accepted would be approved again.

A notice was sent out stating that if the said equipment is in safe and proper condition, they did not wish to inflict a hardship on motorists who had purchased equipment which had once been approved. This was released on February 2.

ROBERT W. A. BREWER,
Consulting Engineer,
Meadowbrook, Pa.

Believes Engineers Should Be Allowed Open Season on Ideas Once a Year

Editor, AUTOMOTIVE INDUSTRIES:

The automotive industry is indebted to several men for their clear analysis of the opportunities and obligations of engineering leadership. F. E. Moskovics wrote a timely article, "If I Were an Engineer Today."* Walter Fishleigh's recent article, "Big Jobs Open for Engineering Leadership,"† is an astute discussion of problems that automotive engineers have before them. Norman G. Shidle has been discussing, among other things, the need of engineers who can leave the drawing office and go out and contact sales and service men of their own and competing organizations. The industry should, and I believe does, appreciate these articles.

Recently, while thinking about these articles, a plan presented itself that has never been tried, as far as I know. If the idea is worth while, I would like to see it developed, and become a valuable policy by leading manufacturers.

Many men in drafting rooms are doing the work outlined and assigned to them in a satisfactory manner. Often, however, a chassis designer or perhaps a detailer will have a "bright" idea about an appealing body design or a safety feature or some driving aid. Or perhaps a body designer may think of a needed improvement in engines or something besides coachwork. Each one is busy on some other task and the idea remains undeveloped.

Why not have, with the full approval, cooperation and encouragement of the executive engineering staff, each man to spend one week each year, or more, "on his own?" He would report to the office, but would have a private room where he would devote his time to ideas that may come to him beforehand or that would present themselves at the time. Nothing that he planned would be "too radical." Perhaps an engine designer might be encouraged to develop the outline of a NEW chassis and body

construction. Or a body designer would devote his time to a cylinder head or a clutch.

I believe that some plan as outlined would not only develop new ideas. It would encourage the best efforts of each employee and increase his confidence both in himself and in his organization. In addition, some men might be advanced more quickly to positions of responsibility.

Yours very truly,
JAMES S. HENRY,
Automotive Engineer,
Houston, Texas.



Floating Crankpin Bushings

Editor, AUTOMOTIVE INDUSTRIES:

The floating crankpin bearings referred to in your interesting description of the Ford V-8 was used in most of my oil engines (U. S. Patent No. 758,397, April 26, 1904).

In two-cycle engines there is no contact reversal in the crankpin box. Every in-stroke being a compression stroke, and the inner half of the box

Streamlining and Car Weight

Editor, AUTOMOTIVE INDUSTRIES:

In connection with the discussion on rear-engined cars, Sir Dennistoun Burney's opinion seems to be that the weight should be distributed two-thirds in the rear and one-third in front.

Now, it is my firm understanding that any fast-moving body should not only be streamlined in shape for efficiency, but it should be heavy in front for stability. I would like to see some scientific discussion on this point.

There can be no doubt that the highway conditions and cars of the future will be designed for much higher speeds than they are today, and in that case the question of stability will be at least as important as the question of streamline for efficiency.

JOHN KIRKEBY,
San Luis Obispo, Calif.

Special Fuel Sold for C. I. Engines

Editor, AUTOMOTIVE INDUSTRIES:

Should *Automotive Industries* not already have mentioned results from a special fuel for compression-ignited engines now marketed abroad (by the Shell Co.) it may interest those who would develop engines of truly high speed to learn that this fuel gives slightly quieter running and a clearer exhaust with less smell.

The amount of interest shown in such fuels by American engineers may do much to advance the day when, as with the spark-ignited engine, much attention will be given to efforts at building fuels to suit the engine rather than attempts at building engines to suit the fuel.

ROBERTSON MATTHEWS,
Bolton, Ont.

*Nov. 8, 15 and 29, 1930, *Automotive Industries*.

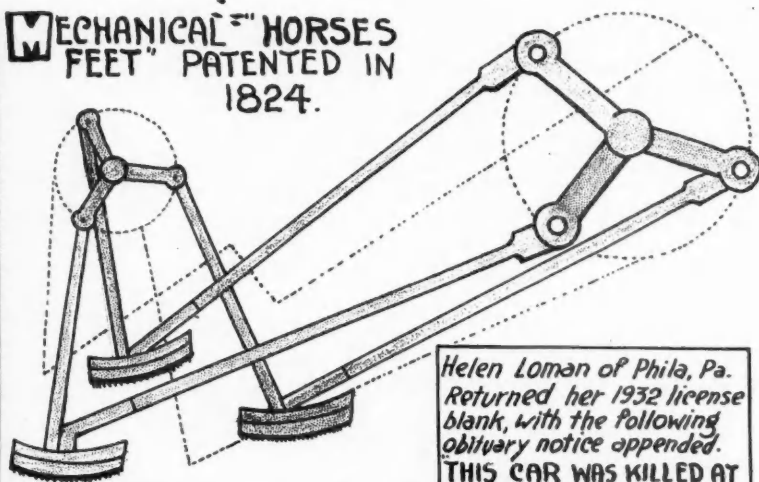
†Dec. 19, 1931, *Automotive Industries*.

Automotive Oddities—By Pete Keenan

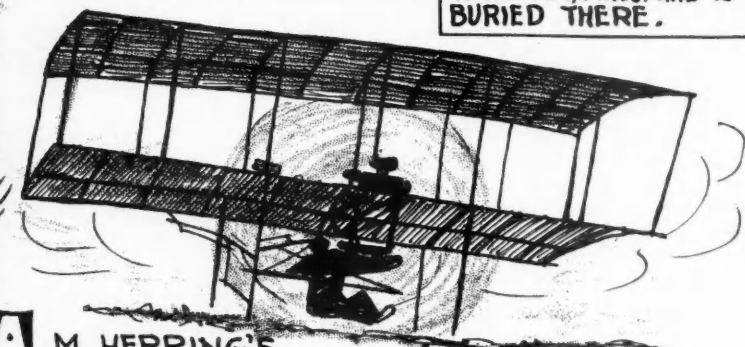
RUTH
SPONSORER
AN AUTOMOBILE
MECHANIC IS
PROBABLY THE
BEST WOMAN
BASKETBALL
PLAYER IN THE
COUNTRY.



MECANICAL "HORSES
FEET" PATENTED IN
1824.



Helen Loman of Phila., Pa.
Returned her 1932 license
blank, with the following
obituary notice appended.
THIS CAR WAS KILLED AT
WORCESTER, MASS. AND IS
BURIED THERE.



A. M. HERRING'S
COMPRESSED AIR FLYING MACHINE 1899. Claimed to be
the first Motor Machine to carry an operator in free flight.

Write us if you know an "Oddity"

The NEWS TRAILER

Goodyear, Goodrich and Firestone have joined the Thrift Garden movement by providing land for employees and exes. Goodrich is providing trucks to haul gardeners to and from plots in the Cuyahoga Valley.

Hainan, which is an island off the south coast of China, has 600 automobiles, of which 99 per cent are American-made. The island, which is cut off from the mainland by turbulent straits, has a population of 3,000,000 persons, with resources to support 10,000,000, according to the Department of Commerce.

Plymouth is offering collegiates and alumni the "Collegiate Special," a sport roadster finished in color combinations pertinent to the leading campus. We know a college with gold and white as its colors. What are you going to do about that, Mr. Mooch?

The Budd Rail Car Division has been active. One of the Budd-Micheline, Knight-engine powered cars was accepted by M. Paul Claudel, French Ambassa-

dor to the U. S., for delivery to French railways. Same week the Pennsylvania R.R. took a Diesel-powered car for experimental purposes. They will try hauling an unpowered trailer car with it.

Air compressors have found a new vocation. In Ottawa, Canada, a DeVilbiss compressor is being used to blow a whistle used when an automatic stop-go traffic light is about to change its mind.

One of our British contemporaries recently reported the British equivalent of what the hungry truck driver orders on an overnight freight haul. Coming to a wayside inn around midnight, the driver and his relief clamber down. Instead of sinkers and coffee, the order often is "sausages and chips, and a pint of tea." But the chatter between the truckers and the short-order artist is probably about the same grade as it is over here.

A receiver has been named for the big hole under the Detroit River, operating under the name of the Detroit & Canada tunnel.

NEWS

Freight Rate Rise Threatens Parts

N.A.C.C. Opposes Change in Scale Affecting Many Items

NEW YORK, May 19—Opposition to the proposal for increasing freight charges on automobile engines, axles, gears and a long list of other motor parts, now rated as fifth class freight in the official territory east of the Mississippi River, has been registered by the traffic committee of the National Automobile Chamber of Commerce at a hearing of the railroads' classification committee in Chicago.

The changes, if enacted, would increase present freight charges an average of 28 per cent, according to an exhibit submitted by the committee, through basing them on 45 per cent of first class rates instead of 35 per cent.

The classification committee will make its report to the rail traffic executives, and it is not unlikely the case will reach the Interstate Commerce Commission for final determination. The Chamber will participate in all hearings.

"In establishing through class rates that apply on these articles from Eastern to Western territory," said J. S. Marvin of the National Automobile Chamber of Commerce, "the Interstate Commerce Commission applied the Western basis or 45 per cent of first class. It is the contention of the industry that the Eastern basis, 35 per cent of first class, should apply.

"Certain Western jobbing interests complained that they are at a disadvantage in using 45 per cent while similar articles are rated 35 per cent within Eastern territory. The Commission has indicated that the railroads should be able to reconcile the classification differences.

"Facts submitted at the hearing show that 90.5 per cent of the total automobile parts tonnage originates in official territory, while 68.2 per cent terminates there. On the other hand, only 7.6 per cent originates in

the West. Based on these data, taken from Interstate Commerce Commission records, it is contended that rates in the East, where the bulk of the traffic moves, cannot reasonably be advanced to attain the desired classification uniformity. Furthermore, these materials are not involved in any discriminations such as cited by the jobbing interests."

Included on the committee representing the industry were:

J. H. Myler (Chrysler)
F. A. Allen (Hudson)
R. R. Shultz (White)
E. F. Stewart (Chevrolet)
E. A. Churchill (Ford-Lincoln)
H. A. Milling (Int. Harvester)
V. Laird (Auburn)
K. A. Moore (National Automobile Chamber of Commerce)

The arguments were also supported by representatives of a dozen parts makers.

Armstrong Spring Absorbed by Buick

FLINT, MICH., May 17—Absorption of the Armstrong Spring Company by Buick Motor Car Co. has been announced here by Irving J. Reuter, president of Buick. With the consolidation, James Parkhill, general manager of the Armstrong Co., a General Motors subsidiary, has resigned. No decision has been reached according to the announcement as to whether manufacturing equipment for the springs will be moved into the Buick plant or retained in the Stewart Avenue plant of the Armstrong Co., although the former appears likely.

Cierva Gets Medal

Award of the Daniel Guggenheim medal for 1932 to Juan de la Cierva for development of the theory and practice of the autogiro, has been announced by the committee of award representing the American Society of Mechanical Engineers and the Society of Automotive Engineers. The medal, which was established in 1928 by the Guggenheim Fund, and which is awarded not oftener than annually, has been received in previous years by Orville Wright, Ludwig Prandtl, and Frederick William Lanchester. Admiral H. I. Cone, commissioner of the U. S. Shipping Board, headed this year's committee.

Gird for Battle

WASHINGTON, May 19—Senators Couzens and Vandenberg of Michigan have served notice that the revenue bill will not leave the Senate with the excise taxes on passenger cars, trucks, parts and accessories if they can prevent it.

Holding the measure utterly unfair, the Senators are determined to fight determinedly against the proposed discriminatory taxes and have undoubtedly considerable strength back of them in the Senate.

How great is this strength, whether sufficient to kill the taxes in the Senate bill, remains to be seen.

Meanwhile automotive manufacturers have intensified their organization against the taxes. In telegrams to newspapers they have urged constituents to telegraph Senators to vote the taxes down.

The motor taxes probably will be reached the forepart of next week, although this is not certain.

New Sales Unit for Studebaker

Corporation Centers Broad Activities in S.P.A.R. Sales Corp.

Further centralization of Studebaker sales efforts, but with a high degree of autonomy for subsidiary companies, is indicated by the formation of the S.P.A.R. Sales Corp., of which Paul G. Hoffman, vice-president of the Studebaker Corp., will be president. Certain sales activities on all vehicles manufactured by Studebaker and its subsidiaries will be combined in the new corporation, which makes available to Pierce-Arrow, Rockne, and S.P.A. truck dealers the facilities of the 18 branch offices formerly serving

(Turn to page 764, please)

Marine Division to Meet

The recently formed Marine division of the Metropolitan section, Society of Automotive Engineers, will hold a meeting at the Park Central Hotel, New York, May 24. Speakers and subjects have been announced as follows: J. C. McCormack, vice-president, Godward Gas Generators, Inc., Fuelizer Survey; Alfred Schwarz, consulting engineer, Fuel Oil Motors Corp., Fuel Oil is the Fuel for Marine Engines; and Julius Kuttner, consulting engineer and editor, Full Proof Motor Boat with Foolproof Diesel Engines.

Monthly Estimate of Motor Vehicle Stocks Abroad April 1

Country	Passenger Cars		Used Cars		Trucks and Buses	
	Low U. S.	Priced Other	Medium U. S.	Priced Other	Heavy U. S.	Light U. S.
Argentina	N	N	H	N	H	N
Brazil	N	N	H	N	H	N
Chile	N	N	H	N	H	N
Cuba	N	N	H	N	H	N
Mexico	N	N	H	N	H	N
Panama	N	N	H	N	H	N
Peru	N	N	H	N	H	N
Uruguay	N	N	H	N	H	N
Porto Rico	N	N	H	N	H	N
Br. Malaya	N	N	H	N	H	N
Japan	N	N	H	N	H	N
N. E. Indies	N	N	H	N	H	N
Siam	N	N	H	N	H	N
Gold Coast	N	N	H	N	H	N
Union So. Africa	N	N	H	N	H	N
Austria	N	N	H	N	H	N
Czechoslovakia	N	N	H	N	H	N
Denmark	N	N	H	N	H	N
France	N	N	H	N	H	N
Greece	N	N	H	N	H	N
Netherlands	N	N	H	N	H	N
Norway	N	N	H	N	H	N
Poland	N	N	H	N	H	N
Portugal	N	N	H	N	H	N
Rumania	N	N	H	N	H	N
Spain	N	N	H	N	H	N
Sweden	N	N	H	N	H	N
Turkey	N	N	H	N	H	N
United Kingdom	N	N	H	N	H	N
Yugoslavia	N	N	H	N	H	N

H-High L-Low N-Normal U-Unusually S-Seasonally —No information forwarded

The above information, based upon data obtained from the most reliable sources, is supplied by the foreign offices of the Bureau. Every care is used in the preparation of the estimates, which are made only after careful investigation. "High" means that the supply is considered large in relation to current state of demand. "Normal" is used almost synonymously with "adequate," that is, when the volume on hand is sufficient to supply immediate requirements plus the estimated demand for 1 to 1½ months. "Low" means that the volume on hand is not considered

sufficient to supply immediate requirements.

A downward trend in stocks of automobiles on hand in foreign countries is shown in stock reports as of April 1, 1932, received in the Automotive Division, Department of Commerce and covering 30 different countries. Fifteen of the countries reported on showed no change in the monthly stock report on passenger cars, and 16 showed no change in the truck situation.

Changes in the stock position of Amer-

ican cars were as follows: low priced units declined in 4 countries and increased in 2; medium priced units dropped in 3; high priced units declined in 3 and increased in but one case. Stocks of European low and medium priced units in these markets were likewise generally downward.

Of 27 countries reporting on used American cars, stocks were high in 12, normal in 9 and low in 6. In the previous month, these used stocks were high in 10, and low to normal in 19 countries.

Continental-Divco Staff

Officers of the Continental-Divco Co., newly formed subsidiary of Continental Motors, will be as follows: W. R. Angell, president; John Nicol, vice-president and general manager; Roger Sherman, vice-president; Wallace Zweiner, treasurer; Craig Keith, secretary; J. K. McKeough, sales manager; B. H. Eaton, purchasing agent; L. D. Mead, chief engineer; Harry Brown, factory manager; and E. Muma, service manager.

Ritter is Appointed

H. J. Ritter, assistant secretary of the Norma-Hoffmann Bearings Corp., Stamford, Conn., has been named sales manager of the corporation in addition to his present duties. Mr. Ritter has been a sales engineer and manager of the New York office of the same organization.

World Automobile Production and Exports of Complete Vehicles in 1930 and 1931*

Producing Country	Production		Exports		Per cent of Production Exported	
	1930	1931	1930	1931	1930	1931
United States	3,355,986	2,389,738	237,581	128,357	7.1	5.4
Canada	154,192	82,621	44,553	13,813	28.9	16.7
Total	3,510,178	2,472,359	282,134	142,170	8.0	5.8
Other countries:						
Austria	3,200	4,200	1,474	932	46.1	22.2
Belgium	4,700	3,200	933	405	19.9	12.7
Czechoslovakia	16,840	16,980	1,494	1,173	8.9	6.9
Denmark	230	180	...	...	...	...
France	230,700	196,860	33,112	28,817	14.4	14.6
Germany	70,064	65,459	5,665	11,220	8.1	17.2
Hungary	861	237	...	...	...	...
Italy	42,685	31,480	20,737	11,918	48.6	37.9
Japan	371	531	...	...	...	...
Poland	288	200	...	...	...	...
Soviet Russia	7,972	23,400	...	...	...	...
Spain	450	250	60	26	13.3	10.4
Sweden	2,400	2,444	150	125	6.3	5.1
Switzerland	1,000	1,070	160	161	16.0	15.0
United Kingdom	234,571	223,219	29,806	24,257	12.7	10.9
Total	616,252	569,710	93,591	79,040	15.2	13.9
Grand Total	4,126,470	3,042,059	375,725	221,210	9.1	7.3

The above export figures do not include re-exports.

*Figures compiled by the Automotive Division, Bureau of Foreign and Domestic Commerce.

Dealers' Stocks of Automobile Tires*

	April 1, 1931			April 1, 1932		
	Number	Dealers Reporting	Average per Dealer	Number	Dealers Reporting	Average per Dealer
Total casings	2,249,927	28,707	78.4	1,590,935	24,029	66.2
High pressure	330,878	21,150	15.6	202,452	16,711	12.1
Inner tubes	3,071,686	28,846	106.5	2,193,848	24,188	90.7
Solids	28,193	1,296	21.8	14,589	818	17.8

* Rubber Division, Bureau of Foreign and Domestic Commerce.

Firestone Develops Rail Tire

The Firestone Tire and Rubber Co. has developed a 48 x 12 low-pressure pneumatic tire for use with a four-wheel-drive tractor operating on rails. The tires are 6-ply and carry 15 lb. pressure. They are said to furnish sufficient traction to move a string of freight cars in switching operations, for which the tractor is designed.

Excessive Tariff Barriers Hinder Trade; U. S. Duties Not 'Friendly,' Says Grossman

Head of Canadian Automobile Chamber of Commerce Outlines Foreign Trade Problems to Toledo Group; C.A.C.C. Collecting Data for Ottawa Conference of British Empire Industries; Canada Signs Preference Tariff Agreement With New Zealand; Benefits Seen

TOLEDO, May 16—World trade has not declined so sharply as has American export and import trade and the real causes are the excessive tariff barriers, a lack of international understanding, and to some extent the foreign exchange value factors, according to D. Ray Grossman, Walkerville, president of the Canadian Automobile Chamber of Commerce, who addressed nearly 500 Toledo manufacturers and exporters at a dinner last Wednesday night.

He said Canadians felt some U. S. duties are not entirely friendly but realized the right of the Americans to regulate their own trade.

"American goods have the merit of quality but merit does not work where there is a lack of understanding of trade customs and markets," he declared. "There is a limit beyond which tariff protection ceases to operate."

He said the most successful of the branch plants in Canada were those which put in entirely independent accounting and control systems conforming to Canadian practices so as to give the entire business a sympathy with customs and methods of doing business in that country.

The coming British Empire Trade conference in Ottawa in July he said would undoubtedly extend the system of empire trade preferences so that it was going to be increasingly difficult to sell into British territories from the outside.

There is even talk of a British Empire currency, he said.

Mr. Grossman said school textbooks do not give the point of view required for good trading with other countries.

TORONTO, May 16—The Canadian Automobile Chamber of Commerce is busily engaged in the collecting of trade data, under the direction of D. R. Grossman, president, for the guidance of those who will be attending the Imperial Economic Conference at Ottawa, in July. Mr. Grossman is vice-president and general manager of The Studebaker Corp. of Canada, Limited.

Three committees have been set up—one to deal with possible purchases of parts and equipment from Empire countries; one to study the prospect of sales of parts and materials peculiar to the automotive industry from Canada to Empire countries, and the third to provide information regarding the sale of finished cars within the Empire.

Mr. Grossman admitted that the situation was rather difficult or compli-

cated, particularly in the matter of tracing the source of supply and obtaining the necessary information thereon. Every effort was being made, however, to secure accurate data for the consideration of the Imperial Conference.

Intimation has been made by the Canadian Government that 2000 delegates and trade representatives from all parts of the British Empire will attend the meeting at Ottawa which will open July 21 and extend over a period of a month or six weeks. A portion of the program for the delegates will be a tour of various cities in Canada and the automobile manufacturers in Toronto, Oshawa and Windsor have expressed a desire to play host to the Empire visitors to show them something of production and methods in the Dominion.

There is yet no suggestion in Canada that the Conference may lead to the manufacture of English cars in existing plants in the Dominion but it is known that at least two Canadian automobile companies would not discourage the idea of taking on the assembly or building of English models in order to round out factory operations. The main object of the conference is, of course, to stimulate Empire trade relations and particular attention will probably be given to tariffs and other preferential treatment to effect this encouragement.

OTTAWA, May 16—Canada's recently arranged treaty with New Zealand may materially increase production at the motor plants in the Dominion, according to leaders of the industry. Indications are, however, that the motor car business in New Zealand is not at a very high peak so the volume of trade resulting from the treaty may not reach immediately the value attained by exports in 1930. In that year, which was the last year before tariffs were raised against Canadian cars, Canada exported to New Zealand nearly six million dollars worth of cars and trucks and chassis. Under normal business conditions in New Zealand, the new treaty with its preference for Canadian automotive vehicles may mean a new market for many hundreds of cars and trucks a month.

TORONTO, May 16—The signing of the New Zealand-Canada Trade Treaty to facilitate inter-Dominion trade by means of preferences in duties and other concessions has brought to the executives of the Goodyear Tire &

Rubber Co. of Canada, Ltd., the hope that tire shipments to New Zealand will be resumed on a large scale.

It is pointed out by Canadian Goodyear that the company's shipments to New Zealand in 1930 under a previous treaty represented a value of approximately \$1,000,000. With the cancellation of that agreement, the Goodyear exports from Canada dropped to \$50,000 in 1931, the New Zealand orders being diverted to the Goodyear Tyre & Rubber Company (Great Britain) Limited at Wolverhampton, England, which has a capacity of 2500 tires per day. Under the new pact, Canadian Goodyear expects to get back some of this business.

Muncie Products Engineers Moved

LANSING, MICH., May 17—With the transfer of the engineering personnel of the Muncie Products Company from Muncie, Indiana, to the Oldsmobile plant here, John G. Wood has been appointed chief engineer of the Olds Motor Works, a post he relinquished just two years ago to assume the general managership of Muncie Products. Coincident with this announcement, C. L. McCuen, recently chief engineer of Oldsmobile, has been promoted to the newly created post of technical assistant to Irving J. Reuter, president of the Oldsmobile and Buick companies. Movement of the engineering personnel of the Muncie subsidiary of General Motors to Lansing, does not involve a move in manufacturing facilities. Muncie produces transmissions for General Motors cars including Oldsmobile and the closer affiliation of engineering activities is in line with Mr. Reuter's plans for more effective coordination of engineering work. Other engineers transferred from Muncie to Lansing include Perry L. Tenney, O. Rasmussen, Harry E. Filder, Carrol K. Lenning, William O. Eastman, Frank Blymyer, Edwin McLean, H. B. Greenlee and K. C. Plasterer.

Litchfield Gets Medal

AKRON, OHIO, May 17—Paul W. Litchfield, president of the Goodyear Tire & Rubber Co., will receive the Spirit of St. Louis medal of the Society of Mechanical Engineers in recognition of his services to the air industry, he was informed this week. The medal will be presented June 7 at the national meeting of the aeronautics section of the society at Buffalo, N. Y.

Rim Assn. Elects Hale

AKRON, OHIO, May 17—James E. Hale of the Firestone Tire & Rubber Co., was chosen president of the Tire and Rim Association, Inc., at a meeting of the organization in Cleveland Saturday. The association embraces plant divisions dealing with the manufacture of rims.

New Sales Unit for Studebaker

Corporation Centers
Broad Activity in
S.P.A.R. Sales Corp.

(Continued from page 761)

Studebaker dealers only.

George M. Graham, Roy Faulkner, and J. M. Cleary have been named vice-presidents of the S.P.A.R. Sales Corp. E. C. Mendler will be vice-president in charge of parts and accessory activities. G. D. Keller will be general sales manager, and L. K. Manley, manager of branches.

The only activities which are consolidated are those which can be most efficiently performed for all companies by one group of men, such as securing dealer representation, wholesale orders and assisting dealers to make their operations more profitable, says the Studebaker announcement.

"While the S.P.A.R. Sales Corporation will supervise and coordinate matters of dealer policy as between the companies, each individual company has complete freedom of action in determining its distributing program in addition to responsibility for sales promotion and advertising. For example, Rockne, the low-priced newcomer in the line, will sell its products through a direct dealer organization without distributors and without territory, while Pierce-Arrow will continue to sell through a limited number of large distributors.

"G. M. Graham will continue as vice-president of Rockne Motors Corp., F. L. Wiethoff, sales manager; J. M. Cleary as president of S.P.A. Truck Corp., C. H. Wondries, vice-president, while R. H. Faulkner, who was recently elected vice-president of the Pierce-Arrow Sales Corp., will also serve as vice-president of the Studebaker Sales Corp. and will divide his time between South Bend and Buffalo.

"The selling headquarters, as well as manufacturing operations of Studebaker and S.P.A. Truck Corp., will continue to be in South Bend, Pierce-Arrow in Buffalo and Rockne in Detroit."

Men who Head S.P.A.R. Sales Corp.



The executive group responsible for S.P.A.R. Sales Corp. activities includes Paul G. Hoffman (upper left) president; R. H. Faulkner (right) vice-president; and George M. Graham (lower left) vice-president. Other vice-presidents of S.P.A.R. are J. M. Cleary and E. C. Mendler



Each of the executives named above will continue to function as executive of the Studebaker subsidiary company with which he is connected. Mr. Faulkner was recently elected vice-president of the Pierce-Arrow Sales Corp. and will divide his time between South Bend and Buffalo

Michigan Registrations Gain

Michigan passenger car registrations for April show a gain of 13 per cent over March, but are 64 per cent behind April last year. Gains recorded were entirely due to the low-priced field in which all members showed increased sales. Plymouth moved into second place with 602 cars against 135 last April and 177 in March. Chevrolet was first, Ford third and Pontiac fourth.

The only cars showing higher

registrations than April last year are DeSoto, Packard and Plymouth. Heaviest losses in April over March were recorded by the middle-priced field, including Hupmobile, Graham, Studebaker and Chrysler. Nash showed a gain over March. Total registrations are 5116 against 4318 in March and 14,166 in April last year.

Commercial cars, with 595, increased four per cent over March but are 54 per cent behind last April. This decrease is almost entirely due to lower Ford and Chevrolet registrations.

Fluctuations of Automotive Securities On the New York Stock Exchange—April

(From the May Bulletin of the New York Stock Exchange)

NAME OF GROUP	COMMON STOCKS				PREFERRED STOCKS				ALL STOCKS				
	No. of Com- panies	No. of Issues	Average Price	Total Shares Listed	Total Mar- ket Value	No. of Issues	Average Price	Total Shares Listed	Total Mar- ket Value	No. of Issues	Average Price	Total Shares Listed	Total Mar- ket Value
Automobile & Truck Mfg. Co's (and Holding Co's)	22	22	\$7.46	83,345,555	\$621,771,343	7	\$60.32	2,363,475	\$142,567,107	29	\$8.92	85,709,030	\$764,338,450
Automobile Access. Mfg. Co's (and Holding Co's)	35	35	5.32	22,562,765	119,960,783	5	20.38	297,409	6,060,820	40	5.51	22,860,174	126,021,603
AUTOMOBILE INDUSTRY.....TOTAL	57	57	7.00	105,908,320	741,732,126	12	55.86	2,660,884	148,627,927	69	8.20	108,569,204	890,360,053
RUBBER TIRE AND GOODS INDUS. TRY.....TOTAL	8	9	5.29	9,680,221	51,241,952	12	24.06	2,659,971	64,012,103	21	9.34	12,340,192	115,254,055
FARM MACHINERY INDUSTRY.....TOTAL	7	6	11.63	8,986,516	94,066,873	5	28.75	3,144,750	90,397,353	11	16.42	11,231,266	184,464,226
Petroleum & Natural Gas Co's.....	42	44	9.73	177,233,111	1,724,620,587	12	33.58	2,176,832	73,089,167	56	10.02	179,408,943	1,797,709,754
Petroleum & Natural Gas Holding Co's.....	2	2	4.55	8,296,789	14,991,920	.....	.....	.....	.....	2	4.55	3,296,789	14,991,920
PETROLEUM INDUSTRY.....TOTAL	44	46	9.64	180,528,900	1,739,612,507	12	33.58	2,176,832	73,089,167	58	9.92	182,705,732	1,812,701,674
AIRPLANES-A'WAYS-A'PORTS.....TOTAL	8	8	3.70	16,745,921	61,968,319	2	8.60	1,381,359	11,874,708	10	4.07	18,127,280	73,843,027
Omnibus Operating Co's.....	3	3	5.59	1,085,335	6,071,693	1	66.00	88,861	5,864,826	4	10.17	1,174,196	11,936,519

May 21, 1932

Automotive Industries

British Tax Basis May Be Changed

The method of computing the annual tax on motorcycles in Great Britain has been changed recently, and hereafter the tax will be based on piston displacement instead of on weight. This has led to speculation as to whether the method of calculation of car taxes will be correspondingly altered. As is well known, in Great Britain cars are now being taxed on the basis of rated horsepower, the horsepower being calculated as proportional to the square of the cylinder bore. It has often been claimed by British writers that this method, which taxes the cylinder bore but leaves the stroke untaxed, has an unfavorable influence on design and is responsible for the relative lack of popularity of British cars in the colonies.

If the horsepower rule had any effect on design it would be to decrease the bore and increase the stroke. Taking the first twenty of the alphabetical lists of American and British passenger-car engines, we find that the former have an average stroke/bore ratio of 1.35, while that of the latter is 1.54. It would thus seem that the horsepower formula had the effect of increasing the stroke/bore ratio, for although the same rule is used by most of the states in this country, the horsepower tax here is comparatively low and certainly does not influence design.

However, it is not at all certain that it is the horsepower formula which is responsible for the greater bore/stroke ratio of English passenger-car engines. The average cylinder size of the English engines is much smaller than that of the American engines, and there has been a tendency in this country to increase the stroke/bore

Pig Iron—Lake furnaces are shipping more iron to automotive foundries against old commitments. Fresh buying is mostly in abeyance. Prices hold fairly steady and unchanged.

Aluminum—Somewhat better demand for secondary metal from automotive foundries is reported by Cleveland and Detroit specialists. The market for virgin metal is unchanged.

Copper—Pending more light on what the fate of the copper tariff will be, the market is marking time. In the "outside" market metal is being offered at 5½ cents, delivered Connecticut, without attracting buyers.

Tin—An advance in Sterling exchange caused the market to steady. At the opening of the week Straits tin was offered at 20½ cents.

Lead—Quiet and unchanged.

Zinc—Slightly lower and steady at the decline.

ratio also as the cylinder volume decreases. The proper method of comparison therefore would be to eliminate the factor of cylinder volume by drawing a curve of stroke/bore ratio vs. cylinder displacement for American and British engines respectively, and see whether for the same displacement the British stroke/bore ratio is greater than the American. An analysis of this sort was made by a British engineer some years ago, and his results were to the effect that the tax horsepower formula had not influenced design to any extent.

Stoughton Co. Reorganized

STOUGHTON, WIS., May 16—The New Stoughton Co. has been incorporated as successor to the Stoughton Co., manufacturer of motor truck and bus bodies, trailers, etc. Stockholders, directors and officers of the original company will be the same in the new corporation and the business will be conducted practically as before. F. J. Vea is president.

Attempt to Boost Steel Prices

Move Viewed as Reaction to Bear Efforts of Buyers

NEW YORK, May 19—Revamping of the price set-up for those descriptions of steel of which preponderant consumption is in the automotive field was tackled in earnest this week as a preparedness move by steel producers and converters. A new card of extras was announced by leading makers of cold-finished steel bars. Automotive consumption of these overshadows all other uses. The new card of extras sets up as the minimum quantity on which the base price shall apply 10,000 pounds, one size of one grade for shipment to one destination at one time, the previous minimum having been 4000 pounds. Extras on 1500 to 3999 pounds are raised by \$4 a ton; for 4000 to 5999 pounds and on 6000 to 9999 pounds extras of \$4 and \$2 a ton, respectively, are scheduled. Minor changes in extras for machine cutting, chemical composition, etc., have been made. Tolerances have been narrowed.

The outstanding change, however, is the quantity extra for smaller than base price lots. The first quotation under the new set-up is announced as 1.70 cents, Pittsburgh, as compared with the previous quotation of 2 cents, which was strictly nominal, fairly large quantity buyers having enjoyed a 1.90 cents price. Buyers of 4000 pounds of one size and grade are, therefore, benefited, while smaller lot buyers must either revise quantities upward or pay proportionately more.

Motor Vehicle Financing in March and Preceding Month*

* Based on data reported to the Bureau of the Census by 351 automobile financing organizations. Figures include complete revisions to date.

	1930 March	1931 March	1932 February*	1932 March**	Totals 3 months (January-March) 1930	1931	1932
Wholesale Financing							
Volume in dollars	\$ 77,545,443	\$63,089,716	\$33,276,393	\$34,204,058	\$191,234,822	\$153,067,347	\$102,322,217
Retail Financing							
Total—							
Number of cars	315,277	237,273	123,574	(1)141,187	680,039	570,721	387,105
Total amount	\$123,525,042	\$91,997,270	\$44,829,138	\$51,318,964	\$282,500,548	\$219,819,241	\$140,776,631
Average per car	\$ 392	\$ 388	\$ 363	\$ 363	\$ 415	\$ 385	\$ 364
New cars—							
Number of cars	139,134	102,665	40,780	46,390	313,073	228,763	128,545
Total amount	\$ 77,207,935	\$55,022,086	\$23,623,496	\$26,985,512	\$175,266,197	\$124,822,102	\$ 74,084,679
Average per car	\$ 555	\$ 536	\$ 579	\$ 582	\$ 560	\$ 546	\$ 576
Used cars—							
Number of cars	166,531	128,311	78,802	90,373	342,661	326,841	246,496
Total amount	\$ 42,393,692	\$34,688,428	\$19,941,665	\$22,852,574	\$ 97,065,675	\$ 89,631,994	\$ 62,768,525
Average per car	\$ 255	\$ 270	\$ 253	\$ 253	\$ 283	\$ 274	\$ 255
Unclassified—							
Number of cars	9,612	6,297	3,992	4,424	24,305	15,117	12,064
Total amount	\$ 3,923,415	\$ 2,286,756	\$ 1,263,977	\$ 1,480,878	\$ 10,168,676	\$ 5,365,145	\$ 3,923,427
Average per car	\$ 408	\$ 363	\$ 317	\$ 335	\$ 418	\$ 355	\$ 325

* Revised.

** Preliminary.

(1) Of this number 32.86 per cent were new cars, 64.01 per cent used cars, and 3.13 per cent unclassified.

Stock Cars In 500-Mile Race

Car Makers Add to Interest With Entries in Indianapolis Event

(Continued from page 747)

Louis Schneider will have two cars in the race, his own mount being the job he drove to victory in 1931. The other was driven last year by Freddie Winnai. However, larger blocks have been fitted to this engine, bringing the displacement up to 151 cu. in. and making these two Bowes Seal Fast jobs practically identical.

Mrs. M. A. Yagle's entry, to be driven by Zeke Meyers, was originally one of Frank Lockhart's 91 cu. in. jobs with which the latter collected plenty of lap money by leading the field for 300 miles in 1927.

Ray Keech at the wheel of the same car won the 1929 race. Larger blocks have been fitted to this job, bringing the displacement up to 132.5 cu. in. In addition four Winfield downdraft carburetors have been fitted directly to the tops of the block.

This car was prepared for the race by M. A. Yagle and appears to be the smallest engine entered.

An interesting feature of the Russo Special, entered by George A. Henry, is the Duesenberg Model A engine, fitted with Ray Day pistons. These pistons were treated by the Alumilite process which is said to give a hard wear-resisting surface.

Frank Brisko again entered his 151 cu. in. job with which he hit the wall last year when a steering arm broke on his 126th lap. The engine is a revamped Miller with Brisko-designed blocks.

"Hoosier Pete," the Clemons entry, is the same as last year except that the independent wheel suspension at the rear has been changed to the conventional design to reduce weight.

"Shorty" Cantlon, who put the four-cylinder Miller-Schofield Special in second place in 1930, will again drive a four-cylinder job, the Lion Head Special.

The Gilmore Lion Special, with Babe Stapp at the wheel, was one of the most striking cars entered. The body lines are radically different from any of the other entries and were designed and wind-tunnel tested by Prof. E. A. Reid, Stanford University.

A special fuel containing no ethyl, developed by the Gilmore Oil Co., will be used. About 175 hp. at 5000 r.p.m. has been claimed for this engine.

Turning now to the so-called "near" stock jobs, we find that Russell Snowberger elected to use a Hupp engine instead of the one used in 1930 and 1931. It will be recalled that Russell placed eighth in 1930 and fifth in 1931 with a semi-stock-engined car

and deserves a great portion of the credit for the interest which has been aroused in this type of job.

Last year he had the pole position, having qualified at 112,796 m.p.h. and he said that his new Hupp engined job will prove to be faster.

The Hupp Comet, as his car is called, is powered with a Hupp engine with standard valve assembly, crankcase, cylinder block, crankshaft, camshaft, pistons, pins, rings and main bearings. However, compression ratio was raised in accordance with racing practice.

In addition to the near-stock jobs mentioned there will be the Shafer Eight entered by Phil Shafer. He used a revamped Buick straight-eight engine fitted with alloy pistons and otherwise altered to conform to Shafer's ideas of a fast-winding power plant.

Richards, Brady and Mikan-Carson-Gardner will use redesigned Studebaker engines in their entrants. The latter, known as the Allegheny Metal Special, has Allegheny metal (18-8 rustless steel) for the cross members, body, intake and exhaust manifolds, gas and oil lines, hood and radiator shell and with the body unpainted but highly burnished presents a striking appearance.

The body is made of 22-gage metal and is said to be stronger than 14-gage aluminum.

Goerlich Business Up

TOLEDO, May 16—Goerlich's, Inc., reports business in heaters and other automotive products will reach a volume of \$4,400,000 this year, which is considerably above last year and nearly twice the company's 1929 business. The Goerlich interests have formed the Lucas Manufacturing Co., as a holding corporation for Goerlich's Inc., and other subsidiaries here. J. E. Goerlich is president of the new company, H. F. Hadley, vice-president, and C. H. Falke, secretary-treasurer.

Chevrolet Transmission Plant is Active

TOLEDO, May 16—Chevrolet Motors Ohio Co. has added a second shift in their local plant manufacturing transmission to speed up production to meet assembly demands, it was announced this week. About 1600 workers are now employed in the plant on a five-day basis.

Horning Sails for Europe

Harry L. Horning, president, Waukesha Motor Co., sailed last week for a two months' business trip to England, France, Italy and other European countries. The purpose of his trip is to complete arrangements for manufacture of heavy fuel Waukesha engines in several of these countries.

Invents Automatic Headlight Dimmer

An invention by Serge Vassilake of Paris is said to make the dimming of automobile lights automatic at the approach of cars going in the opposite direction, according to a report to the Commerce Department from Trade Commissioner W. L. Finger, Paris.

If an automobile equipped with this mechanism has its headlights on, the lights of any automobile coming toward it acts upon a very sensitive plate, cutting the full light circuit and closing the "dimmer" circuit as long as the light falls upon it, it is reported.

The apparatus is so sensitive that the rays of a medium dim light act upon it at an average of 400 meters, it is stated. Even dim city street lights will affect the mechanism.

Despite this automatic control the driver still has full command of lights, is able to flash them off and on at will.

The equipment is composed of two essential parts, a converging "optique" system containing the sensitive plate and which is placed between the two headlights, and an ensemble consisting of a dry cell and relay which cuts the circuits.

Soviet Union Notes

The city of Moscow now has about 15,000 automobiles, as many as the entire Soviet Union had four years ago. During 1931 the number of cars throughout the country increased from 34,000 to 65,000.

A congress of Soviet inventors was recently held in Moscow at which a program for 1932 was outlined. The congress adopted the following slogan: "Save One Billion Rubles for the U.S.S.R. in 1932." One of the aims of the Inventors' Association is to increase its membership to one million this year, and to draw into the Association all workers and engineers who are inventors. Special provisions are to be made for experimental facilities for the use of inventors in different cities. A number of exhibits showing recent inventions are to be organized throughout the U.S.S.R.

Eight motor trucks produced at the Yaroslavl automobile plant recently made what is said to have been a successful trial trip to Moscow. The machines, which are of the six-wheeled, 5-8-ton type, operated satisfactorily despite heavy snow encountered on the way. One of the machines, a 5-ton truck of 82.5 hp., has a Mercedes-Diesel engine which permits the use of heavy oil.

Wilcox Names Voorhies

Wilcox-Rich Corp. has announced the addition of Carl Voorhies to the development and research engineering staff of the company. Mr. Voorhies was formerly with Pierce-Arrow Motor Car Co.

Junkers Difficulties Pressed for Solution

After negotiations with the German Department of Transport and with the Continental Gas Company, for further financial aid, had failed, the Junkers Works of Dessau, Germany, on April 6, made application to the local courts for an intercession with its creditors. The application calls for a one year's moratorium and for the appointment of a creditors' committee which is to supervise the enforcement of the moratorium and to have access to the books of the company. It is hoped that the moratorium will give the company time to carry through negotiations for the acquisition of additional capital, as well as for an internal reorganization.

The Junkers Works comprise a number of subsidiaries, viz., the Research Institute Professor Junkers, Junkers Aircraft Works, Junkers Persian Air Transport, Junkers Motor Manufacturing Works, Junkers & Co. (hot-water heating equipment) and Kalorifer Works (hot-air heating equipment). Some of these subsidiaries, notably the motor manufacturing plant, have shown profits in recent years, but others worked at a loss, and altogether there was a loss of about two and one-half million dollars from the beginning of 1929 to Sept., 1931. At the present time some of the subsidiaries, especially the aircraft plant, have considerable orders on hand and could continue, were it not for the fact that they are hampered by a lack of working capital.

For a long time there is said to have been considerable friction and antagonism between various executives of the Junkers industries, and the commercial and technical departments of the concern also have not been able to get along together very well. There is little doubt, however, that the Junkers Works will be placed in position to continue operations; negotiations for the investment of additional capital are said to be in progress with several financial institutions, including one non-German, and the Minister of Transport is credited with the remark that it was intended to extend further Government aid, provided a reorganization were carried through with private means.

Wisconsin Tax Interpreted

MADISON, WIS., May 16—The state ton-mile tax on motor trucks, enacted by the 1931 Wisconsin Legislature to be effective Jan. 1, 1932, affects only between 2500 and 3000 trucks instead of approximately 27,000, and instead of raising \$1,000,000 revenue annually will barely cover the cost of administration, under the interpretation just made by the state supreme court in litigation brought by the Wisconsin Allied Truck Owners' Association. The court holds that the law exempts all

trucks of 3 tons net weight or less, whereas the state public service commission was proceeding on the theory that the legislature intended to exempt all trucks of 3 tons or less when loaded. The law was enacted at the behest of the railroad brotherhoods, which sought to eliminate what they consider unfair competition. The public service commission had built up a bureau with a personnel of 39 inspectors to administer the law. All have been given indefinite leave of absence, pending a survey of probable revenues under the court's interpretation of the law.

G. M. Savings Plan Suspended

NEW YORK, May 17—The savings and investment plan operated for its employees by the General Motors Corp. has been temporarily suspended, according to an announcement from Alfred P. Sloan, Jr., president of the corporation. Mr. Sloan's statement follows:

"By action of the board of directors, effective as of May 1, 1932, the savings and investment plan is temporarily suspended.

"Under this action no further payments on the part of employees will be received by the Corporation until the plan is reinstated. This temporary suspension of the Savings and Investment Plan is made necessary by the present economic situation, as the plan costs the Corporation a large sum of money that is not available for this purpose under present conditions of business. This action is only another step among many others that the Corporation has taken to maintain its strong operating position. It is the hope of the Corporation that the suspension will not be of long duration, but this depends entirely on how quickly normal business operations can be resumed.

"Previous classes of the Savings and Investment Plan including the 1932 class up to and inclusive of April 30, 1932, will be allowed to mature in the usual way."

Koehler Leaves G. M. Truck

W. L. Barth has taken over the work of R. C. Koehler, who has resigned as assistant director of service for the General Motors Truck Co.

Reo Names Parker

Carl Parker has been named head of the truck division of the Reo Motor Car Co. He was previously associated with Reo in that capacity for many years, from the time of Reo's entry into the commercial car field in 1911. Mr. Parker was, until recently, associated with the Federal Motor Truck Co. as supervisor of branches.

Standard Names Donaldson

The Standard Motor Co., Ltd., Coventry, England, has established a sales promotion department which will be in charge of J. W. Donaldson.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, May 18—Despite the seasonal increase in retail trade last week, general business remained dull, with widespread unemployment. The improvement in retail trade was far less noticeable in the far West than in the East. Business is being stimulated somewhat by the loans made by the Reconstruction Finance Corp.

CAR LOADINGS

Railway freight loadings during the week ended April 30 totaled 554,012 cars, which marks a decrease of 8368 cars below those during the preceding week, a decrease of 220,730 cars below those a year ago, and a decrease of 388,662 cars below those two years ago.

ELECTRICITY PRODUCTION

Production of electricity by the electric light and power industry in the United States during the week ended May 7 was 12.7 per cent below that a year ago.

BUSINESS FAILURES

Commercial failures during April, according to R. G. Dun & Co., numbered 2816, as against 2951 during March and 2383 a year ago. The liabilities involved in the April failures totaled \$101,068,693, as against \$93,760,311 in March and \$50,868,135 a year ago.

NEW YORK EMPLOYMENT

The level of employment in New York State factories in April was 3.6 per cent below that in March. The usual seasonal decline for April is 1 per cent. Total factory payrolls decreased 6.7 per cent. The March-to-April decline in employment was the largest since 1914.

CRUDE OIL OUTPUT

Average daily crude oil production in the United States for the week ended May 7 amounted to 2,251,900 barrels, as against 2,177,500 barrels for the preceding week and 2,468,700 barrels a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended May 14 stood at 61.4, as against 61.6 the week before and 61.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended May 11 were 30 per cent below those a year ago.

STOCK MARKET

The trend of the stock market last week was downward, and the movement was accelerated as the week progressed. Reports indicate that the decline in prices was based on further dividend reductions and omissions and on President Hoover's alleged favorable attitude regarding relief loans to states and a bond issue to relieve unemployment. Trading was on a very small scale, and net losses for the week were general.

RESERVE STATEMENT

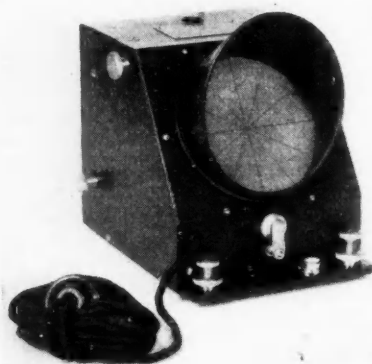
The consolidated statement of the Federal Reserve banks for the week ended May 11 showed decreases of \$35,000,000 in holdings of discounted bills and of \$2,000,000 in holdings of bills bought in the open market. Holdings of Government securities increased \$98,000,000. The reserve ratio on May 11 was 65.6 per cent, as against 66.8 per cent a week earlier and 67.9 per cent two weeks earlier.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Davey Vibrometer

An instrument designed to measure the amplitudes of horizontal and vertical vibrations simultaneously is being offered by Electrocon Corp. of New York. It is based on the principle of the seismograph and comprises a suspended mass whose natural frequency is under 100 per min., and it is claimed that the instrument will indicate accurately the amplitudes of vibrations of frequencies higher than 400 p. min. The instrument is set down on the



body whose vibrations are to be measured. Photographic records may be obtained of any repeating vibrations. Ordinarily the vibrations show a closed track of light on a ground glass with horizontal and vertical scale marks. To make a photographic record, a standard film holder is slid into a slot immediately behind the ground glass and the film is exposed for about 5 sec.

The New Kron Scale

The Kron Co., Bridgeport, Conn. (formerly American Kron Scale Co.), have just improved their line of industrial scales in appearance and operating mechanism.

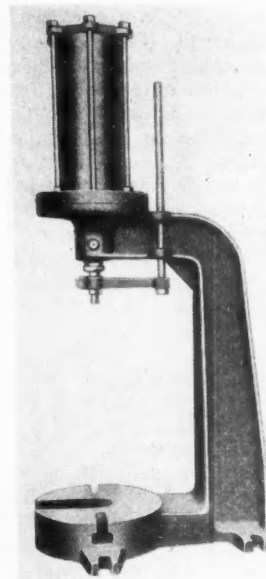
Over 48 bearing points have been eliminated in the dial mechanism—the six remaining bearing points being ball bearings of high carbon chrome steel with tolerances of less than one ten-thousandth of an inch.

The sector has been constructed so as to offset vibration that may be present in the building. The pointer points and remains steady at the proper weight. This allows quicker and more accurate reading of the weight.

Hannifin Air-Operated Arbor Presses

The Hannifin Mfg. Co., Chicago, has added a line of air operated arbor presses, designated series A 1, designed to meet the need for a direct acting press with generous throat dimensions. The distance from table to the ram is 11 in. and from the center of the ram to the back of the throat is 8 in.

This model will be furnished in five sizes to deliver pressures ranging from 565 lb. to 6280 lb. Any length of stroke may be specified up to 10 in. The frames in all sizes are made of cast steel thus assuring the rigidity



needed in an open gap press.

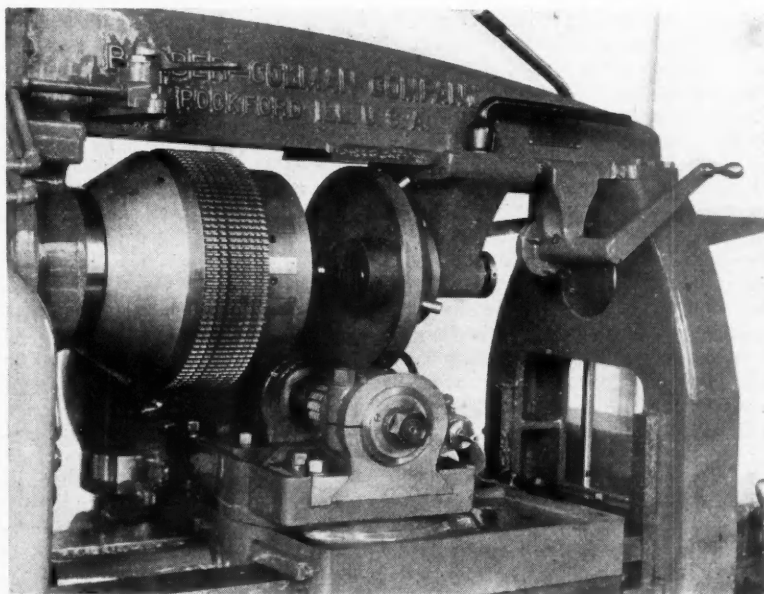
An important feature is that provision is made for guiding the ram to

prevent turning. These presses may be obtained with either hand or pedal operated control valves.

Production Hobbing Machine

The Barber-Colman Type B hobbing machine has been adapted, by means of a special expanding work arbor actuated by a compact and rapid operating hydraulic unit, for the

nates the trouble ordinarily encountered when an attempt is made to load an arbor with a number of thin, large-diameter ring gears. The load can be put on and taken off without any difficulty, but the blanks are firmly held during the cut, as the arbor is expanded within them and they are clamped securely from the ends. This



production hobbing of starter ring gears for automobile flywheels, according to an announcement by the manufacturers, Barber-Colman Co., Rockford, Ill. The special work arbor is particularly interesting because of the expanding feature which elimi-

expanding mechanism is operated by oil pressure from a unit mounted at the end of the machine which contains an oil reservoir and a motor-driven pump with an automatic control that maintains a certain pressure in the oil lines at all times.

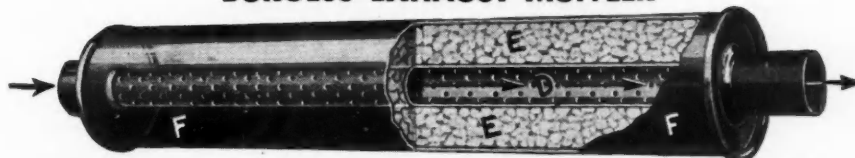
FLEXIBILITY OF DESIGN



IN BURGESS CARBURETOR SILENCERS

To the advantages of better silencing, especially on the higher frequencies, must be added the ready adaptability of the Burgess principle to whatever shaped space is available.

BURGESS EXHAUST MUFFLER



As illustrated above, the Burgess Muffler consists of three principal parts: a straight open perforated pipe, D, surrounded by a sound-absorbing material, E, which is enclosed in a metal covering, F. The exhaust gases from the engine pass straight through the perforated pipe, D, but the exhaust noises are absorbed, assuring satisfactory muffling.

BURGESS

BATTERY COMPANY

ACOUSTIC DIVISION, MADISON, WISCONSIN
DETROIT ADDRESS: 542 NEW CENTER BUILDING

ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

Will Study Lubricants

S.A.E. Subcommittee Undertakes Task With Bureau Cooperation

(Continued from page 753)

prolonged running with loads equivalent to full engine torque. The Gleason method for hypoid gears is a well-known example of the latter type.

All such tests have been open to the very serious objection that they were costly to conduct. Moreover, when the lubricant failed, a set of gears was ruined and even if the test was successful the subsequent use of the gears for production was open to question.

Finally, it was difficult if not impossible to draw from one set of test results satisfactory conclusions regarding the suitability of a given lubricant for a different set of conditions.

In order to avoid these objections and to reduce the time required for testing a lubricant, a number of different types of special test machines have been built by concerns interested in the problem. The best known of these are the General Motors Abrasion Test Machine¹ and the Timken Roller Bearing Company's Oil Testing Machine².

The most outstanding fact developed by comparison of the results obtained with the various test machines using identical lubricants is that there is an astonishing lack of agreement between machines in the rating of individual products.

Further, the divergence in results is even more marked when service experience is taken into consideration. On one machine a given lubricant may pass and give good results in service while on another machine it may fail. Some lubricants fail in service yet appear to be satisfactory, based on test machine results.

In brief it may be said that today there is no test machine or method available which will rate correctly the E.P. characteristics of all of the different types of lubricants as shown by their performance in service.

Other properties of E.P. lubricants are important and there is a wide divergence of opinion regarding suitable methods of evaluating them.

With the object of establishing satisfactory methods for rating E.P. lubricants an S.A.E. Committee was organized in the spring of 1931 to study the existing situation and map out a program for the necessary research work.

This committee represents all the interests involved, automotive manu-

facturers, operating companies and refiners. During the past year it submitted to the Bureau of Standards the results of these tests of a wide variety of E.P. lubricants made both in service and with the different types of test machines. The results of the Bureau's study of these data have already been stated.

There is no satisfactory yardstick for E.P. lubricants today.

To rectify the situation the E.P. Lubricant Research Committee formulated the program outlined and has collected sufficient funds for the Bureau to start with the necessary work.

Until the program has been completed, it is safe to say that the indications of any test machine should be considered as directive only, and by no means a final criterion of the value of E.P. lubricants.

Howard E. Maynard

Howard E. Maynard, 53, assistant chief engineer of the Chrysler Corp., died suddenly May 12 at his residence in Detroit. Death resulted from a paralytic stroke which came without warning.

Mr. Maynard was born at Amherst, Mass., on March 10, 1879. He was educated at Massachusetts Agricultural College, Worcester Polytechnic Institute and Boston College.

Wooler in Europe

Ernest Wooler, chief engineer, Timken Roller Bearing Co., sailed May 12 for Genoa, Italy, on a trip which probably will last about 30 days and take him to several European countries. He will attend the International Ball and Roller Bearing Conference at Milan, Italy, on June 2 as a representative of the Ball and Roller Bearings division of the S.A.E. Standards Committee. He will represent also the Sectional Committee of Ball Bearing standardization sponsored by the S.A.E. and the A.S.M.E. under procedure of the American Standards Association.

Chrysler Control Changed

The dash control for the automatic clutch and free-wheeling mechanism on all Chrysler models has been changed by the addition of a halfway position which cuts out the automatic clutch action, but leaves the free-wheeling unit effective.

Budd Companies Lose

The Edward G. Budd Mfg. Co. reports a net loss for the first quarter of 1932 of \$541,346, compared with a profit of \$28,020 for the same period last year.

The Budd Wheel Co. reports a net loss for the first quarter of 1932 of \$450,166, compared with a profit of \$214,079 for the same period, 1931.

+ + CALENDAR OF COMING EVENTS + +

FOREIGN SHOWS

Buenos Aires, Automobile Show	May 20-29
Belfast, Commercial	May 25-28
Bordeaux, Fair	June
Cork, Commercial	June
Inverness, Commercial	June 21-24
Southampton, Commercial	July 5-9
Llandrindod, Wales, Commercial	July 20-22
London, Olympia Show	Oct. 13-22
Glasgow, Scottish Motor Show	Nov. 11-19

CONVENTIONS

Automotive Engine Rebuilders Assoc., Indianapolis	May 30-June 2
Natl. Automobile Chamber of Commerce, New York (Annual Meeting)	June 2
American Soc. Mechanical Eng. (Natl. Aeronautic Meeting)	June 6-8
Buffalo	June 6-8
American Soc. Mech. Eng. (Natl. Oil & Gas Meeting) State College, Pa.	June 8-11
Pacific Coast Aero. Meeting (A. S. M. E.), Berkeley, Calif.	June 9-10
Soc. of Automotive Engineers, White Sulphur Springs (Summer Meeting)	June 12-17
Associated Business Papers, Shawnee-on-Delaware	June 18-19
Motor & Equipment Wholesale Assn., Chicago	June 20-24
American Society for Testing Materials, Atlantic City (Annual Meeting)	June 20-24
Amer. Soc. Mechanical Engineers, Bigwin, Canada (Semi-Annual Meeting)	June 27-30
Natl. Association of Taxicab Owners, Chicago	July 7-8
Natl. Team & Motor Truck Owners Assoc., Chicago (Annual)	July 17-19
National Team & Motor Truck Owners Assn., Detroit	July 17-19
American Chemical Society, Denver, Colo.	Aug. 22-26
S.A.E. Aircraft Meeting, Cleveland	Aug. 30-Sept. 1

American Society Mechanical Engineers, Cleveland, O. (Machine shop practice meeting)	Sept. 12-17
American Trade Association Executives, Atlantic City (Annual)	Sept. 15-17
Penna. Automotive Assn., Harrisburg, Pa.	Sept. 19-20
Natl. Assoc. of Motor Bus Operators, Chicago	Sept. 22-23
American Electric Railway Assn., Chicago, Ill.	Sept. 22-23
Amer. Institute Mining & Met. Engrs. (Petroleum Division), Dallas, Texas	Sept. 30-Oct. 1
Amer. Society for Steel Treating, Buffalo	Oct. 3
Amer. Institute Mining & Met. Engrs. (Iron & Steel Division), Buffalo, N. Y.	Oct. 3-6
National Safety Council, Washington, D. C.	Oct. 3-7
American Welding Society, Buffalo, N. Y.	Oct. 3-7
American Society Mechanical Engineers, Buffalo, N. Y. (Natl. Iron and Steel Meeting)	Oct. 3-8
S. A. E., Annual Transportation Meeting, Toronto	Oct. 4-6
American Gas Association, Atlantic City (Annual)	Oct. 10-14
Natl. Hardware Assn. (Accessories Branch), Atlantic City, N. J.	Oct. 17-22
American Society Mechanical Engineers, New York City (Annual Meeting)	Dec. 5-9
Natl. Exposition of Power & Mechanical Engineering, New York	Dec. 5-10

RACES

Indianapolis	May 30
Detroit	June 5
Altoona	June 12
Roby, Ind.	June 19
Altoona	Sept. 5

¹ Paper presented at the 12th Annual Meeting, American Petroleum Institute, at Chicago, Ill., Nov. 12, 1931.

² See S.A.E. Journal, Jan., 1931, p. 53; Vol. XXVIII, No. 1.

MORE VITAL THAN EVER . . .

The 1932 Potential
Savings with—
**ORIGINAL FELLOWS
GEAR SHAPER
CUTTERS**



Beyond equipping your gear department with modern High Speed Gear Shapers you require the use of Original Fellows Gear Shaper Cutters to realize the maximum profit in the cutting of your gears.

YOU GET: Greater accuracy and fewer rejects; your scheduled output from fewer Gear Shapers; reduced operating and overhead expenses; a direct saving in overall production cost. These advantages prove out even on "short rations." Today, you need every possible saving to swell present meager profits.

The *Versatility* of the Fellows Gear Shaper for high accuracy machining of parts *other than gears* is an additional factor worth considering. **NOW IS THE TIME TO REALIZE ON THE INHERENT ECONOMIES IN THIS MACHINE.**

In figuring the immediate and future returns on the money invested in High Speed Gear Shapers, you may require specific information which a Fellows Representative has at his finger tips. We suggest you ask to have him call. Write:

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
616 Fisher Building, Detroit, Michigan

*The High Speed Gear Shaper with
Original Fellows Gear Shaper Cut-
ters will help you to compete prof-
itably in producing gears for today's
market.*

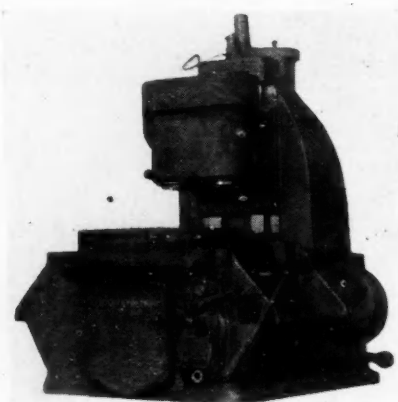
FELLOWS ~ GEAR SHAPERS ~

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Mil-waukee-Mil Rotary-Type Miller

A rotary-type vertical milling machine, developed for high-production manufacturing purposes, has been introduced by the Kearney & Trecker Corp., Milwaukee. The machine embodies the strength and rigidity, together with the high speeds and fast feeds necessary for the application of tungsten and tantalum-carbide cutters, as well as cutters made from other materials. Such operations as face, side and straddle milling, slotting, form cutting and the finishing of radial faces are among the classes of milling that can be handled in the machine.



An outstanding feature of the machine is the worm drive to the table. The table is 36 in. in diameter and is driven by a large, heavy worm-wheel, almost equal in size, which is mounted solidly on the bottom. Table feed changes, of which there are 18, are by means of pick-off gears. Changes are made at the feed-change box, which is conveniently located at the front of the machine next to the control levers. A table feed ratio of 40 to 1 is provided so that the full benefits of tungsten carbide may be gained even in cases where the cut is light in nature, or where the material being machined is soft, such as aluminum, where unusually fast feeds are desired.

The table has two feed rates, one the normal feed and the other power rapid traverse. In operation, the table can be fed at the selected feed rate through the cut, then it can be engaged into rapid traverses at the rate of 240 in. p. min. to the next station,

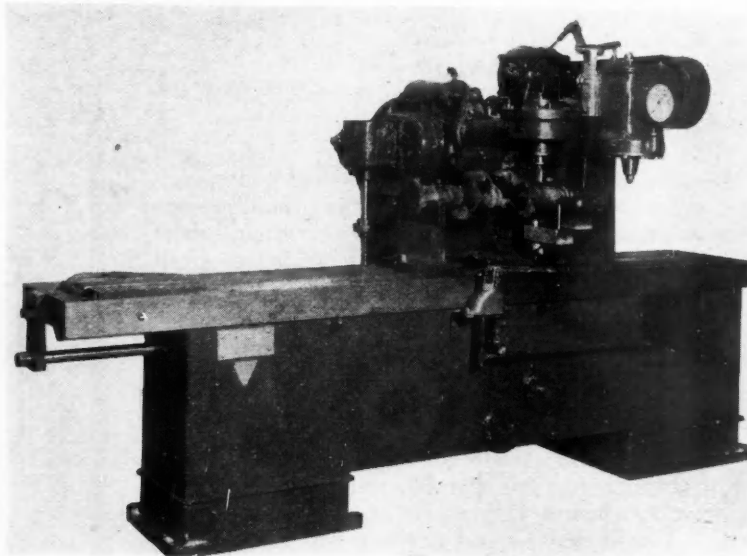
after which the normal feed is again engaged.

Table control is by means of two levers—one at the right adjacent to the table is for directional control, and one at the front of the bed is for selecting the table movement, either feed or power rapid traverse. A crank is furnished at the end of the bed for hand movement of the table in either direction, as a convenience for setting-up purposes.

Either a single or double spindle head may be furnished as desired. The head illustrated has two spindles, one of which is mounted in a quill and has ample adjustment to compensate for cutter wear. Special heads with one or more spindles in any position or combination may also be obtained.

Millholland Milling Unit

An automatic machine for testing the hardness of crankshafts and other forgings on a production basis has been placed on the market by the Millholland Corp., Indianapolis, Ind. A Millholland No. 4 milling unit is used in conjunction with a Brinell testing apparatus. The machine is



entirely automatic in character, except for loading and unloading. This feature, coupled with its ability to mill the spot for testing to the same depth each time, insures uniformity.

The piece is chucked on the reciprocating work table while the table is at the extreme left end of its travel,

Speed changes for the head are by means of pick-off gears located in the box at the top of the upright. Spindle speeds are furnished in any one of four optional ranges of 15 to 150; 20 to 200; 30 to 300; or 50 to 500. There are 18 speed changes to each range. The spindle control lever is located at the front of the machine, at the right side, thus grouping the three controlling levers for convenient operation at the normal loading position.

New Lincoln Push Button

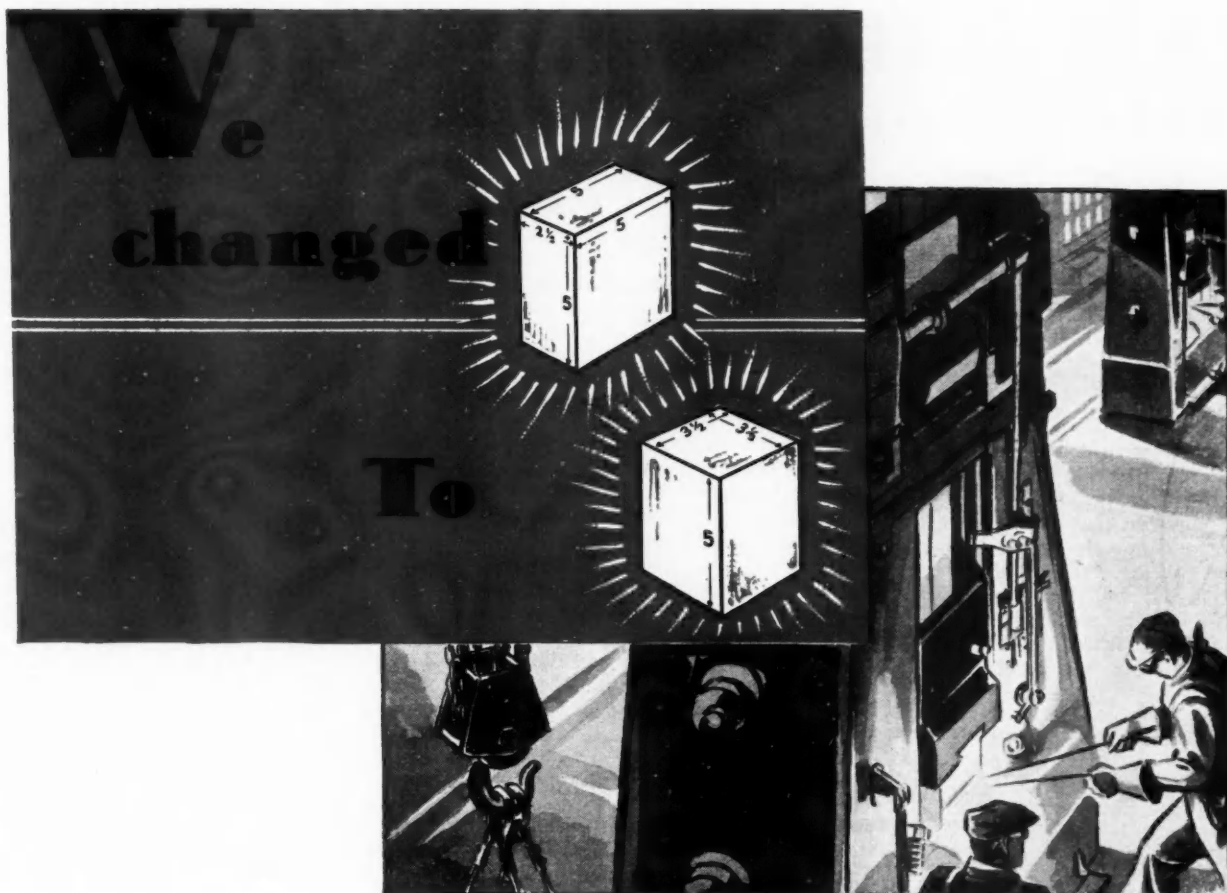
According to a recent announcement the Lincoln Electric Co., Cleveland, Ohio, has improved the safety push button introduced early last year; a feature of this switch is that the start button is inside of the stop button. The stop button can be operated from any angle by merely striking the front of the control box with the flat of the hand, but the start button must be operated with the finger. The stop button can be locked in the off position by pushing it in and twisting it to the right. Heavy springs prevent accidental operation of either button when not locked.

It is claimed the button will handle the heaviest control circuits up to 600 volts a. c. or d. c. because the contact opening is larger than usual.

where the crank is clear of the milling cutter. The operator then depresses the starting valve, which starts the automatic cycle. The table advances to the milling station where the milling unit mills the spot to be tested. Continuing to the Brinell station the table dwells long enough for the impression to be made. The Brinell apparatus is operated by a sys-

tem of levers actuated by an auxiliary cam on the same shaft as the cam feed of the milling unit.

It is claimed that one man can handle approximately 100 cranks per hour. The holding fixture can be changed rapidly to accommodate different types and sizes of forgings.



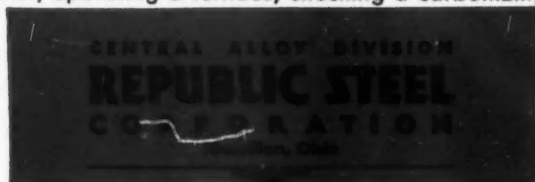
AND THE SEAMS DISAPPEARED

A PROMINENT drop-forging shop . . . producing steering knuckles for a well-known automobile company . . . and an epidemic of seam-like defects that showed up at the spindle end. Naturally, the drop forger laid the trouble to the steel.

Again Republic Metallurgists responded to the call. Carefully selected forging blanks, conceded to be free from defects, were forged under various hammers, in a variety of ways. Soon they discovered something—the defects occurred even when the stock was stood on end (length of the blanks being the same as the width). More checking, more study and they were sure of their ground—the proportions of the forging blank were wrong—the ratio of height to width was too great. Unless the blank was placed just so under the hammer, laps resulted.

On the recommendation of Republic Metallurgists, dimensions of the forging blank were changed from $2\frac{1}{2}'' \times 5'' \times 5''$ to $3\frac{1}{2}''$ square $\times 5''$. This did not increase the weight of the forging blanks, or add to the cost—but it did eliminate the trouble.

Resourceful, ingenious fellows, these Republic Metallurgists. At home in a pair of overalls—running a drop-forging hammer, operating a furnace, checking a carbonizing mixture, planning a heat-treating cycle, redesigning a forged part for better contours—doing everything but selling—they never carry a price list.



AGATHON ALLOY STEELS

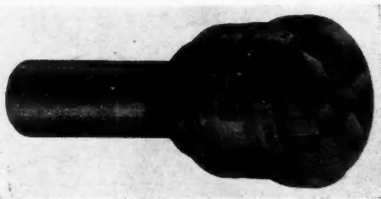
NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Adjustable Blade Hollow Mill

The Type H hollow mill with adjustable blades recently placed on the market by the Gairing Tool Co., Detroit, is designed for heavy duty work particularly in connection with Stellite, tungsten-carbide, etc. Blade adjustment is $\frac{1}{4}$ in.; additional adjustment to $\frac{3}{8}$ in. may be made when the mill is used for medium or finish cuts.

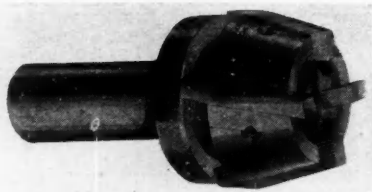
Adjustments are made by rotating



the cone-shaped external nut, which has direct bearing on the outer edge of the blade. A micrometer dial on the adjusting nut is graduated in thousandths to give any required diameter. Blades have a positive lock secured firmly in the body, and are of such construction that tilting is impossible when used for heavy duty work. All blades are interchangeable. Bodies are of alloy steel, heat-treated to insure long life.

General Purpose Hollow Mill

The latest addition to the line of end cutting tools made by the Gairing Tool Co., Detroit, is a new serrated blade hollow mill designed to promote economy in hollow mill operations on light roughing and finishing cuts or for turning operations not requiring our



heavy duty mill. It is made with replaceable blades, easily and quickly adjustable. The body can be fitted with drills, reamers or form blades.

Blades are set radially for machining brass, bronze, cast iron, etc., and at an angle for cutting steel.

The serrated blade is securely anchored in position by engaging a corresponding serration in the body. A hardened and ground steel wedge, supporting the blade the entire length of the body, holds the cutting blade rigid.

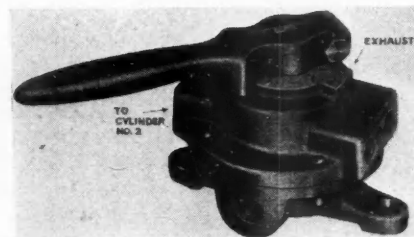
Quick adjustment for release or replacement of blades is afforded by the lock screw holding the wedge. Adjustment is both radial and lateral. Each blade has a minimum of $\frac{1}{2}$ -in. blade life.

Hannifin Duplex Valve

The Hannifin Mfg. Co., Chicago, has placed on the market a Duplex air control valve, designed for use on machines which employ two air cylinders which operate in progressive

sequence. The valve has four independent outlet posts for control of two double-acting cylinders, so designed that two cylinders can be operated in either direction and in any sequence desired.

For example—the valve can be connected with two cylinders resulting in the following order of operation: Starting with lever at one extreme position, then moving the lever 45 deg., causes piston of cylinder No. 1 to move



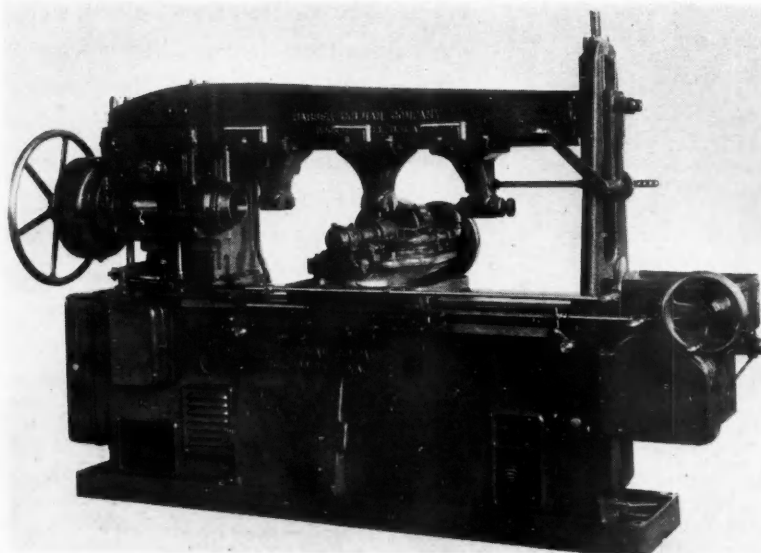
forward; moving lever an additional 45 deg. causes piston of cylinder No. 2 to move forward; moving lever back 45 deg. reverses cylinder No. 2 and moving lever to original position reverses cylinder No. 1.

The duplex valve embodies all of the features of the standard Hannifin "packless" valves and is furnished in two sizes—Model D-37, with $\frac{3}{8}$ in. I. P. connections, and Model D-75, with $\frac{1}{2}$ in. I. P. connections.

Spline Shaft Hobbing Machine

Barber-Colman Co., Rockford, Ill., has produced a model hobbing machine which is especially suitable for the cut-

stop rods and bars, the power shaft for the feed box, and the overhanging arm, are lengthened accordingly. The outer end of the overhanging arm is raised and lowered by a screw driven from the work spindle elevating mech-



ting of long spline shafts. The standard Type A machine has been adapted for this work by the lengthening of the bed. Other parts of the machine, such as the feed screw, the automatic

anism, thus insuring that alignment of the arm with the bedways will be maintained. All other parts of the long-bed model are the same as the standard Type A machine.